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Soils of the Gulf Islands of British Columbia

Volume 1 Soils of Saltspring Island

Report No. 43 British Columbia Soil Survey 1987

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Report No. 43 of the
British Columbia Soil Survey

L.J.P. van Vliet, A.J. Green, and E.A. Kenney

Soil Survey Unit
Land Resource Research Centre
Vancouver, B.C.

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(Map sheets 92B/11, 12, 13, and 14)

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Cover photo: Fulford Valley and Fulford Harbour,
looking southeast from Mount
Maxwell Provincial Park.

Courtesy: Province of British Columbia

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PREFACE

This report and soil map of Saltspring Island and lesser islands cover an area of 18 555 ha in the Gulf Islands of British Columbia shown on map sheets 92B/11,12,13, and 14 in the National Topographic Series. The aim of this detailed survey is to provide soils information at a scale of 1:20 000 for local planning purposes. It emphasizes the soil limitations that are important to residential development and agriculture.

After a short introduction (Part 1), Part 2 contains a description of the environment of the survey area, including climate, vegetation, geology, physiography, and soil parent materials. Part 3 consists of survey and mapping procedures. In Part 4 the soils and map units and their distribution and extent are described. Part 5 contains interpretations for residential development and agriculture. Typical profile descriptions and analytical data for the major soils on Saltspring Island are included in the Appendix.

The soil map shows the distribution and extent of the soil map units. The map legend identifies each map unit by color and symbol. It gives the proportion of dominant, subdominant, or minor soil components, the origin and texture of the parent materials, the soil depth, the soil drainage, and the landscape characteristics for each map unit. The report and map are complementary; therefore, it is necessary to use both in order to fully understand the soils. The soil map with an extended legend has also been produced on a 1:20 000 orthophoto base, and may be viewed at the Map Library, Maps B.C., Ministry of Environment, Victoria, B.C.

This publication is the first in a series of five volumes on "Soils of the Gulf Islands of British Columbia," Report No. 43 of the British Columbia Soil Survey.

PART 1. INTRODUCTION

The first soil survey that included the Gulf Islands was completed in the late 1950s (Day et al. 1959). This soil survey at a scale of 1:63 360 (2.5 cm to 1.6 km) served a very useful purpose to land planners and agriculturists over the years. During the Canada Land Inventory mapping program in the 1960s more soils information was obtained for the Gulf Islands in order to produce capability maps for agriculture and other uses (1:50 000). Since that time, some of the Gulf Islands were surveyed in more detail by different agencies in response to requests from the Islands Trust of the Ministry of Municipal Affairs and Regional Districts. The soil maps were used by planners to draft official community plans for the islands. No published soil survey reports accompanied these maps. With increasing population pressures on the Gulf Islands (Barr 1978), Islands Trust identified the need for more detailed resource information for land use planning. In 1978 the Islands Trust requested the Terrestrial Studies Section of the Surveys and Resource Mapping Branch, B.C. Ministry of Environment, to undertake a comprehensive and detailed mapping program covering the Gulf Islands, south of Nanaimo, which are under the jurisdiction of the Islands Trust. It was decided to produce a biophysical data base by means of resource folios for each of the southern Gulf Islands at a scale of 1:20 000. The soil inventory part of the resource folios became the responsibility of Agriculture Canada, B.C. Pedology Unit, Vancouver, under a program called the Gulf Islands soil survey. In addition to the islands under the jurisdiction of the Islands Trust, this soil survey program included all other southern Gulf Islands from Nanaimo to Victoria.

The objectives of the Gulf Islands soil survey are as follows:
- to produce an updated soil inventory for the southern Gulf Islands at a scale of 1:20 000, using the latest soil survey, data handling, and map production techniques.
- to produce soil maps and legends for resource folios for the Islands Trust through the B.C. Ministry of Environment.
- to produce interpretive soil ratings and maps for the Islands Trust and other users.
- to publish the soil maps and soil survey reports for each island or group of islands.

Fieldwork for the Gulf Islands soil survey commenced during the summer of 1979, with the soil inventory for Galiano, Valdes, and Thetis islands. Interim soil maps and legends as part of the resource folios for these islands were published in 1980 by the Terrestrial Studies Section, B.C. Ministry of Environment.

Saltspring Island covers 18 555 ha. Fieldwork for the soil inventory for Saltspring Island took place during the summers of 1980 and 1981. The interim soil maps (north sheet and south sheet) with extended legend were published in 1983 as part of the resource folio for Saltspring Island (Van Vliet et al. 1983).

This publication is the first in a series of five volumes on "Soils of the Gulf Islands of British Columbia," Report No. 43 of the British Columbia Soil Survey. The other publications will be entitled: Volume 2: Soils of Pender, Prevost, Mayne, Saturna, and lesser islands; Volume 3: Soils of Galiano, Valdes, Thetis, Kuper, and lesser islands; Volume 4: Soils of Gabriola Island and lesser islands; and Volume 5: Soils of Sidney, James, Moresby, Portland, and lesser islands.

PART 2. GENERAL DESCRIPTION OF THE AREA

Location and extent

Saltspring Island is located in the Strait of Georgia between the British Columbia Mainland and Vancouver Island (Fig. 1). The area extends from 48°43' to 48°56' north latitude and from 123°22' to 123°36' west longitude. Saltspring Island, the largest and most populated of the Gulf Islands, is approximately 26 km long with an average width of 9 km, comprising an area of 18 555 ha (Islands Trust 1978).

Most of the land on Saltspring Island is privately owned. However, there are three provincial parks, two ecological reserves, crown land, land controlled by the agricultural land reserve, and land in tree-farm certificates. The main center of population is Ganges. (Fig. 2).

History and development

Saltspring Island's name originates from the springs of brine located on private property on the island's north end. It is the only Gulf Island with saline springs.

Population

Saltspring Island became the first of the Gulf Islands to be settled. In 1857, a group of nine black people from California settled near Vesuvius (Obee 1981). They were joined in 1859 by several others (Williams and Pillsbury 1958), and since then the population had grown to 4410 by 1976 (Islands Trust 1978). Most of the population lives in the northern part of the island, between Ganges and Southey Point. Ganges, the island's commercial and service center, is also the center of new residental development and a proposed major community sewage disposal system. St. Mary Lake, Fernwood, Vesuvius Bay, and Long Harbour also have small communities. The only concentrated population center south of Ganges is Fulford, although there are homes at various places throughout the region between Ganges and Fulford Harbour (Fig. 2).

There are a number of artisans living on Saltspring Island. A major contributor to the economy is the service industry, catering to the large number of retired people living on the island and to the tourist industry.

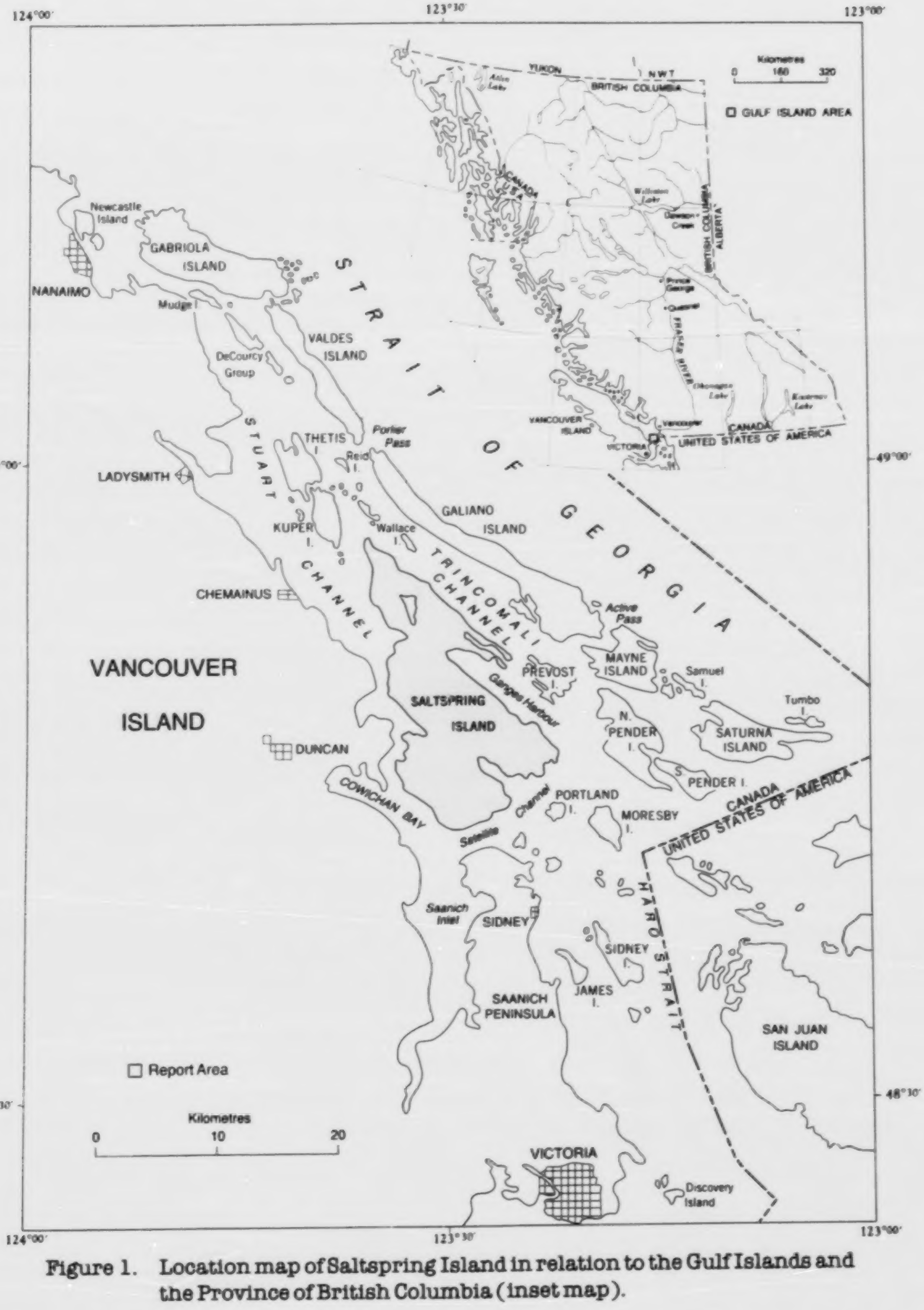

Figure 1. Location map of Saltspring Island in relation to the Gulf Islands and the Province of British Columbia (inset map).

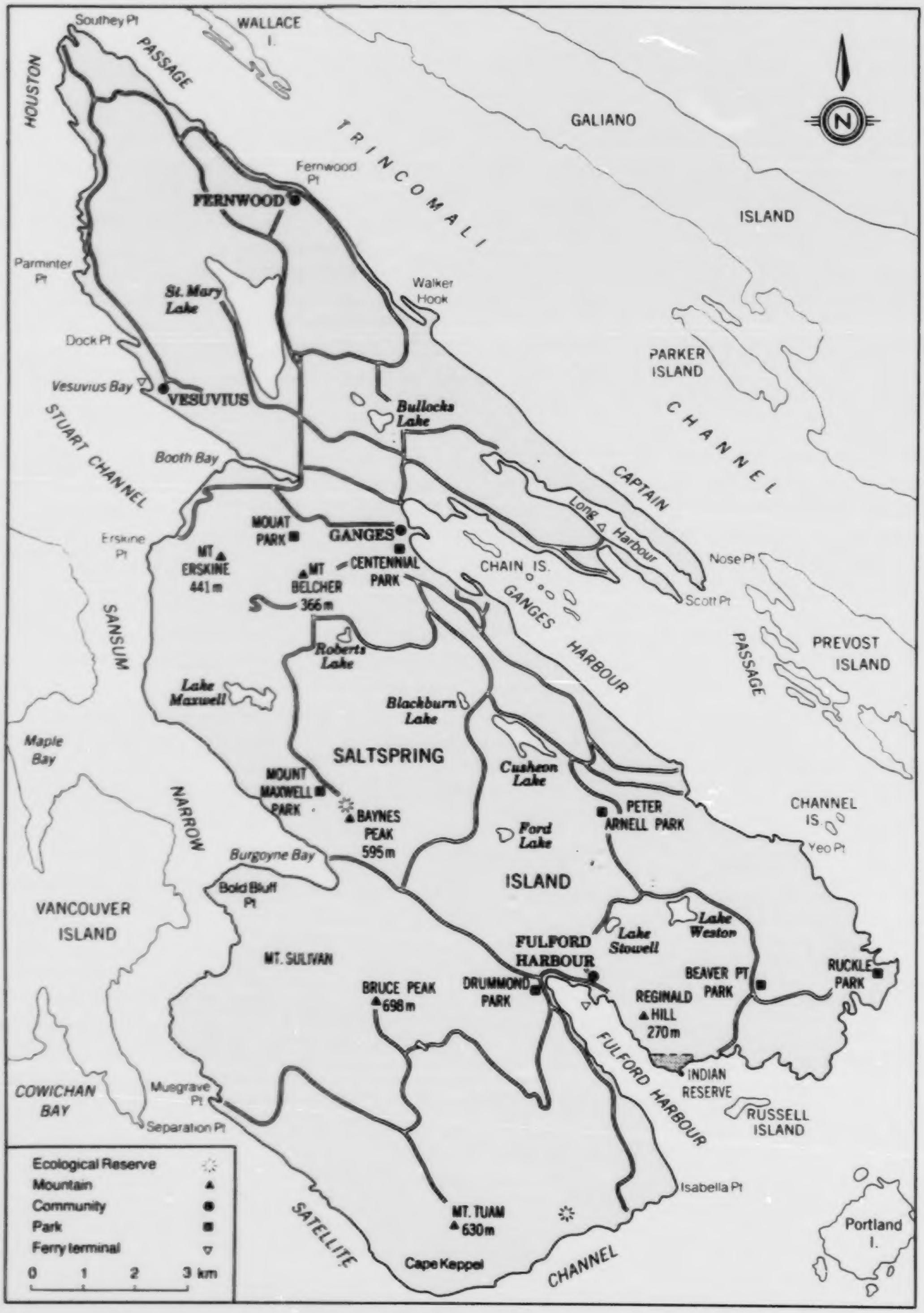

Figure 2. Saltspring Island

Land use

The original settlers and the subsequent early population were principally homesteaders and farmers who sold their products to the Vancouver Island and mainland markets in addition to supplying local needs. By the turn of the century, there were 80 farmers on Saltspring Island (Obee 1981). Few full-time farmers are found on Saltspring Island today. Small holdings dominate the farm scene. Sheep and lamb, beef and dairy cattle, poultry, and hay are the main agricultural commodities, along with small amounts of potatoes, fruit, and vegetables, all produced mainly for the local market (B.C. Min. Agric. 1978). One of the few independent dairies in British Columbia producing unpasturized milk is located near Burgoyne Bay. There is a total of 3573 ha in the agricultural land reserve (Islands Trust 1978).

Second-growth timber provides a basis for a small logging industry with coast Douglas fir, grand fir, western hemlock, and western red cedar being the commercial species. Saltspring Island has six certified tree farms, with a total area of 2253 ha, operated mainly by MacMillan Bloedel. There are also small operators on private land (Islands Trust 1982).

There is a small Indian reservation located 1.5 km southeast of Fulford. There are four provincial parks (Ruckle, Beaver Point, Mouat, and Mount Maxwell) covering 720 ha (Parks and Outdoor Recreation Division 1981), and two ecological reserves covering 319 ha (Ecological Reserves Unit 1981). Other local parks are Drummond, Peter Arnell, and Centennial (Fig. 2). There are numerous sandy beaches on the island, some with public access. Some of the small lakes are popular swimming areas.

The increasing population has resulted in a high demand for residental land over the past several years. An official community plan for Saltspring Island (Islands Trust 1982) specifies the different land use categories and regulates development in accordance with agreed upon goals and policies.

Transportation and energy

The provincial government operates three ferries with regular sailings to Saltspring Island from the mainland and Vancouver Island. Saltspring is also serviced by float plane and water taxi. There are approximately 640 km of roads on the island, most of which are winding and narrow (Obee 1981). The major roads are paved and follow along the valley bottoms and areas of low relief separating the highlands.

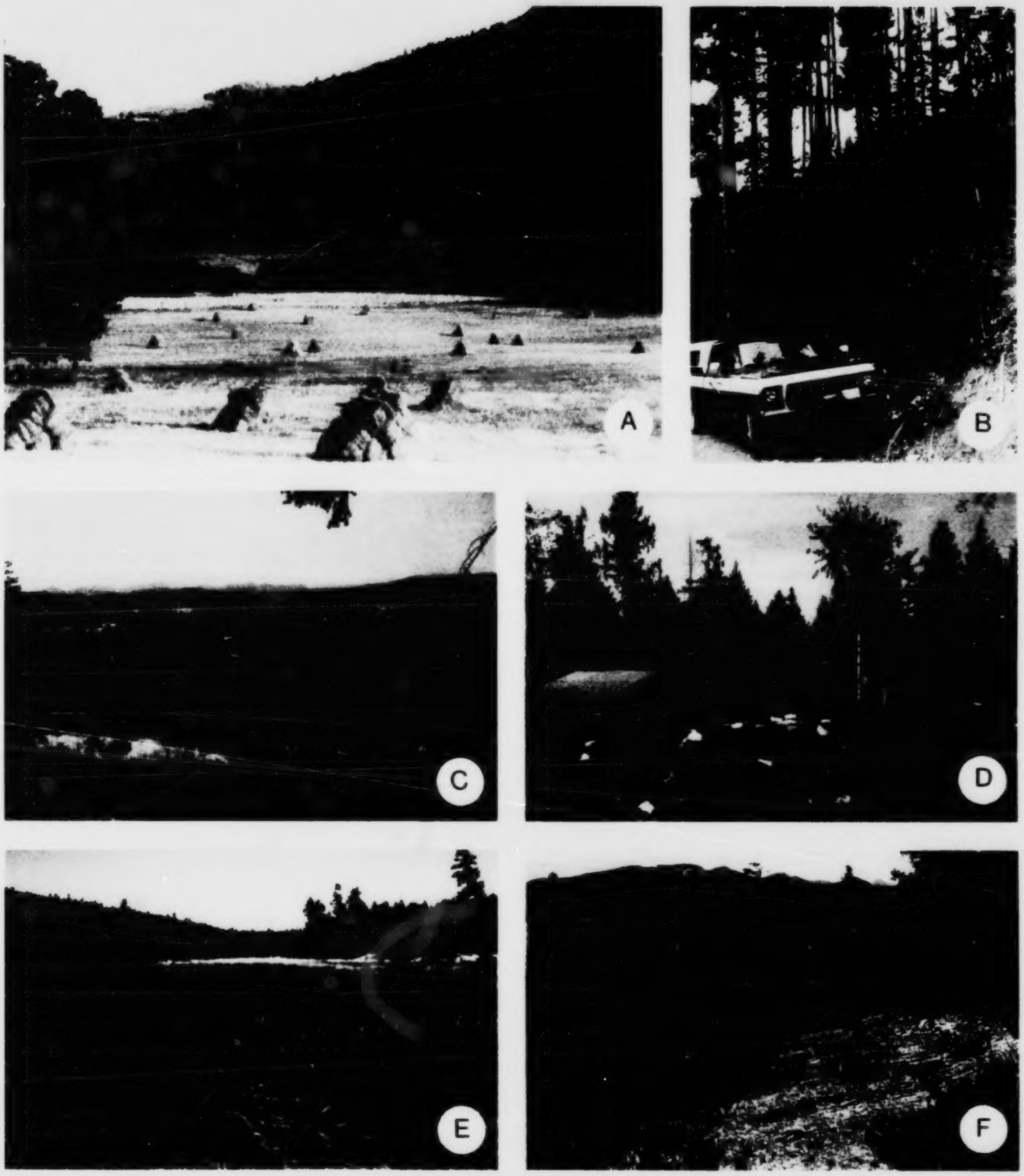

Plate I (a) Haygrowing for local use in the Fulford Valley on deep Cowichan and Fairbridge soils (photo credit T. Ovanin, Victoria).

(b) Second-growth coast Douglas-fir in steep terrain on shallow Musgrave and Mexicana soils near Musgrave Landing.

(c) St. Mary Lake. Lowland with complex deposits of glacial till (Mexicana soils), marine materials over till (Trincomali and Suffolk soils), and deep marine materials (Brigantine, Parksville, and Tolmie soils).

(d) Sheepfarming on very shallow stony Haslam soil complex over sandstone and shale bedrock.

(e) Peat bog of Metchosin soils north of St. Mary Lake used for hay and pasture.

(f) Typical landscape dominated by Rock and very shallow Saturna soils on a 30% slope, off Sunset Drive.

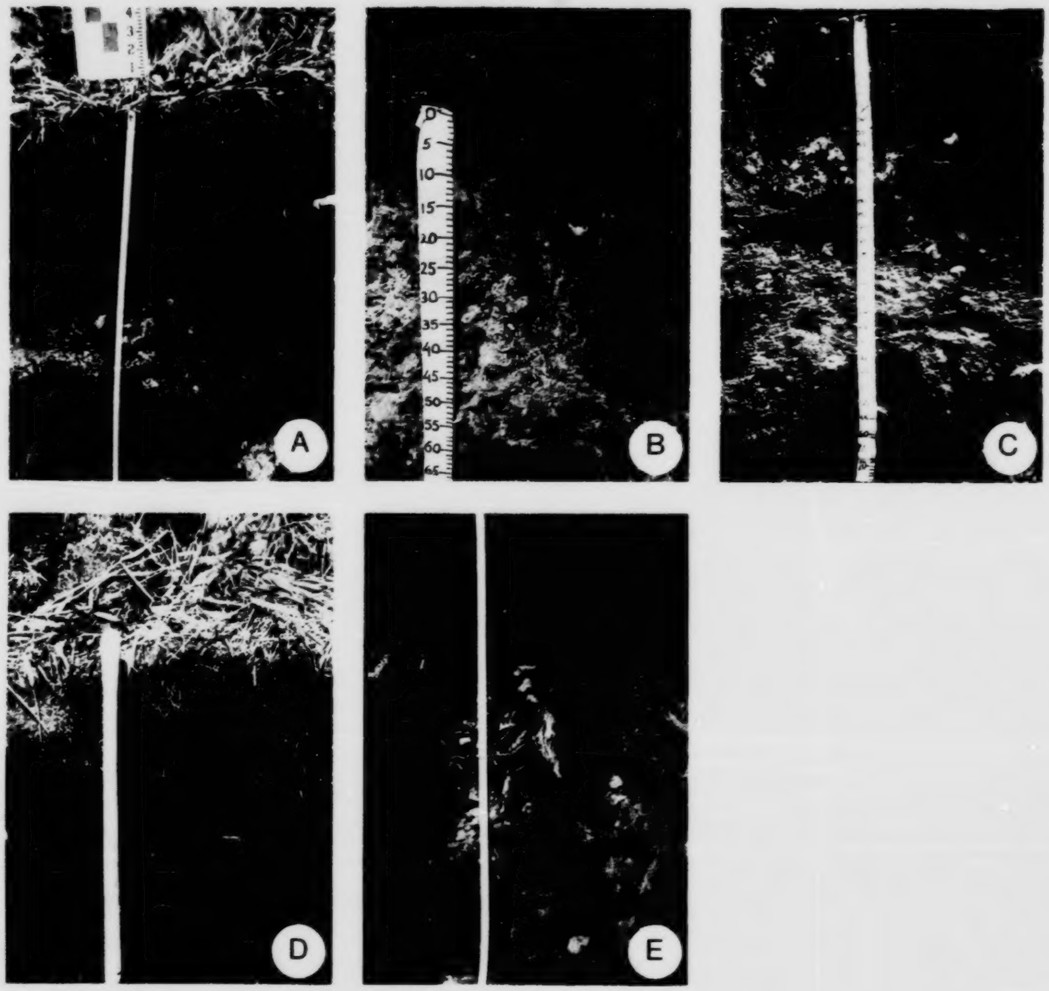

Plate II (a) Tolmie soil (Orthic Humic Gleysol) developed on deep silty clay loam marine sediments, often cleared and used for hay and pasture.
(b) Fairbridge soil (Gleyed Dystric Brunisol) developed on deep loam to silty clay loam marine sediments, often used for hay and pasture.
(c) Shallow Mexicana soil (Orthic Dystric Brunisol) overlying compact glacial till at 70 cm.
(d) Metchosin soil (Typic Humisol) on deep well-decomposed peat deposits.
(e) Shallow Saturna soil (Orthic Dystric Brunisol) overlying sandstone bedrock.

Electricity is brought in from the mainland and one of the high-voltage supply lines from the mainland to Vancouver Island crosses Saltspring Island.

Water supplies and drainage

The groundwater on Saltspring Island is generally of favorable quality except in areas near saline springs in the northeast end of the island. There are 14 saline springs, which vary from 1 m to 25 m in diameter. Ground-water development near some coastal areas has resulted in seawater intrusion, which has occurred at Scott Point, Southey Point, Beaver Point, and Erskine Point (Hodge 1977).

The groundwater in the southern part of the island is generally of superior quality relative to the northern portion. The marine origin and the low porosity and permeability of the bedrock in the northern portion of Saltspring Island are partially responsible for the poor water quality in some locations. Pre-Cretaceous metamorphic rock has more open fractures, which allow more frequent flush and renewal of groundwater storage in the southern portion of Saltspring Island (Hodge 1977). It has been suggested by Winsby (1973) that the most profitable groundwater exploration on the island would occur in areas that are most highly jointed, fractured, and faulted.

There are 440 drilled wells, 137 dug wells, and 83 springs on Saltspring Island (Hodge 1977). Drilled wells, with the principal aquifer reported as fractured shales and sandstones, supply approximately 60% of the groundwater used. The depth of bedrock wells ranges from near the surface to 165 m. The domestic yield is moderate for most of the wells. Where the water supply is dependent upon spring-fed creeks and shallow wells, the water supply may dry up during the summer months.

There are nine freshwater lakes on Saltspring Island, all of which are sources of water for domestic use (Fig. 2). These lakes comprise an area of 292 ha. The largest lake, St. Mary Lake (182 ha), supplies water to residents through the north Saltspring water district. Cusheon Lake (27 ha) supplies up to 280 000 L/day to a subdivision and to homes around the lake (Goddard 1976). The third largest lake on Saltspring Island, Lake Maxwell (26 ha), is the water supply area for Ganges. No development around this lake and no water activities such as swimming and boating are allowed. Lake Weston (18.5 ha) on the southeasterly part of Saltspring Island supplies water to the community of Fulford. All other lakes on Saltspring Island (Bullocks, Stowell, Ford, Roberts, and Blackburn) are between 2 and 11 ha in area.

Different departments within the B.C. Ministry of Environment are studying and monitoring the water quality of some of the lakes on Saltspring Island, including St. Mary and Cusheon lakes.

The drainage on Saltspring Island consists of intermittent streams. Duck Creek drains St. Mary Lake into Duck Bay, whereas Cusheon Lake and Maxwell Lake are being drained by Cusheon Creek and Maxwell Creek, respectively. Many more unnamed creeks exist on the island.

Climate

The climate of the Gulf Islands is strongly influenced by the Olympic Mountains to the south and the Insular Mountains to the west which together cause rain shadow effects in the study area. The climate of the southern Gulf Islands is often referred to as Cool Mediterranean Climate (Kerr 1951), reflecting conditions similar to that of much of the northern Mediterranean region. The summer temperatures are somewhat lower but the drought during the summer months is, generally speaking, just as marked. The climate is characterized by cool dry summers and humid mild winters.

The climate of the southern Gulf Islands has been well described by Coligado (1979). Some of the more important climatic data pertaining to the southern Gulf Islands are summarized in Table 1.

Specific long-term climatic data for Saltspring Island at Ganges and Vesuvius climate stations are presented in Tables 2 and 3 and in Figs. 3 and 4. More recently, additional climate stations were established at St. Mary Lake and Cusheon Lake. The recorded temperature and precipitation data for the new stations are incomplete and of too short duration to report.

Natural vegetation

The Gulf Islands occur in the Drier Maritime Subzone of the Coastal Douglas-fir (CDF) Biogeoclimatic Zone (Krajina 1969) and the Georgia Strait section of the Coastal Forest Region of Rowe's (1977) classification. The CDF zone ranges in elevation from sea level to 450 m in the southern portion, including southern Gulf Islands, and to 150 m in the northern portion (Klinka et al. 1979). The characteristic tree species of the CDF zone, and therefore of Saltspring Island, is Pseudotsuga menziesii var. menziesii (coast Douglas fir). Spelling of botanical names is according to Taylor and MacBryde (1977).

Table 1. Summary of climate data for the southern Gulf Islands

Temperature	
January mean temperature:	2.9-3.8°C
January mean minimum temperature:	- 0.5°C
Extreme low winter temperature:	-16°C (Vesuvius, November 1920)
July mean temperature:	16.3-17.3°C
July mean maximum temperature:	22-24°C
Extreme high summer temperature:	38°C (Ganges, July 1966)
Precipitation	
Average annual rainfall:	750-900 mm
Average annual snowfall:	30-40 cm
July and August (driest months):	<5% of annual precipitation
November-January (wettest months):	almost 50% of annual precipitation
October-April:	80-85% of annual precipitation
Miscellaneous	
Freeze-free period:	>200 days
Hours with bright sunshine	
May-September:	1300-1400 h
Annual:	>1900 h
Average fog occurrence:	30 days of the year (mainly between September and February)
Windiest period:	November-January
Least windy period:	May-September

Reference: After Coligado (1979).

Table 2. Mean temperatures and other climatological parameters derived from temperatures for Vesuvius and Ganges, Saltspring Island

Climatic parameter	Vesuvius	Ganges
January mean minimum (°C)	0.7	-0.1
July mean maximum (°C)	23.2	22.6
Annual mean temperature (°C)	10.2	9.8
Lowest minimum recorded (°C)	-16	-15
Highest maximum recorded (°C)	34	38
Average frost-free period (days)	225	222
Number of days with freezing temperatures	48	52
Average growing degree-days (>5°C)	2076	1976
Average effective growing degree-days (>5°C)	1031	1097
Average heating degree-days (>18°C)	2977	3094

Reference: After Coligado (1979).

Table 3. Mean precipitation, snowfall, and potential evapotranspiration for Vesuvius and Ganges, Saltspring Island

Climatic parameter	Vesuvius	Ganges
Precipitation		
Annual (mm)	846	1026
May-September (mm)	135	165
Extreme 24-h (mm)	87	68
Number of days with rain	145	137
Snowfall		
Annual (cm)	40	52
Extreme 24-h (mm)	33	31
Number of days with snowfall	7	12
Potential Evapotranspiration		
Annual (mm)	421	422
May-September (mm)	369	368

Reference: After Coligado (1979).

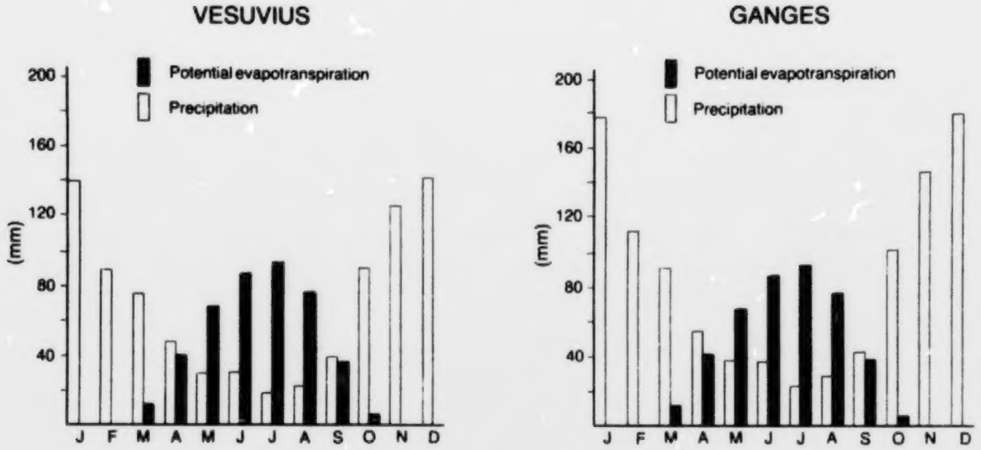

Figure 3. Mean monthly precipitation and estimated potential evapo - transpiration for Vesuvius and Ganges, Saltspring Island (after Coligado 1979)

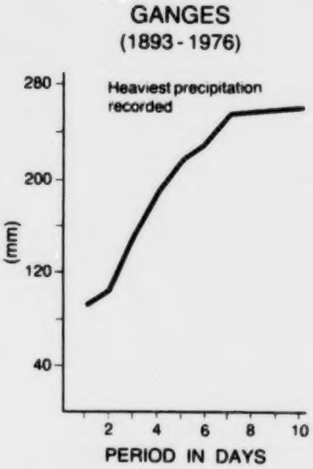

Figure 4. Extreme precipitation for Ganges, Saltspring Island (after Coligado 1979)

Within the drier subzone, on drier, open sites where the soils are shallow over bedrock, *Quercus garryana* (Garry oak) and *Arbutus menziesii* (Pacific madrone) occur. The Garry oak tends to form pure stands and is restricted to southern exposures. On Mount Maxwell on Saltspring Island 65 ha of an undisturbed Garry oak stand were set aside in 1972 as an ecological reserve (Ecological Reserves Unit 1981). Pacific madrone occurs more frequently than Garry oak, often in association with coast Douglas fir.

In 1971, 254 ha of a Pacific madrone-coast Douglas fir forest were set aside as an ecological reserve on Saltspring Island. Other coniferous tree species that occur are *Abies grandis* (grand fir), *Thuja plicata* (western red cedar), *Pinus contorta* (shore pine), *Picea sitchensis* (Sitka spruce), and *Tsuga heterophylla* (western hemlock). The deciduous trees occurring on Saltspring Island are *Alnus rubra* (red alder), *Acer macrophyllum* (broadleaf maple), *Populus balsamifera* spp. *trichocarpa* (northern black cottonwood), *Cornus nuttallii* (western flowering dogwood), and *Prunus emarginata* (bitter cherry).

The shrub layer is dominated by *Gaultheria shallon* (salal) and *Mahonia nervosa* (Oregon grape). There is a low presence of herbs and mosses. Many species of spring flowers occur, especially in pockets of shallow soils on bedrock outcrops. The Gulf Islands flora is likely one of the most varied in British Columbia (Krajina 1969; Klinka et al. 1979; Hirvonen et al. 1974; Taylor and MacBryde 1977).

Species such as *Epilobium angustifolium* (fireweed), *Ulex europaeus* (common gorse), *Cytisus scoparius* (Scotch broom), *Urtica dioica* subsp. *gracilis* (American stinging nettle), *Festuca occidentalis* (western fescue), and *Dactylis glomerata* (orchard grass) occur on disturbed sites. Saltspring, like the other Gulf Islands, has been extensively disturbed through fire, logging, grazing, and urban and rural activities (Hirvonen et al. 1974).

The Drier Maritime Subzone of the Coastal Western Hemlock (CWHa) Biogeoclimatic Zone occurs at the higher elevation (above 450 m) and on northern slopes of moderate elevations on the Gulf Islands (Krajina 1969; Klinka et al. 1979). Coast Douglas fir, the common successional tree species to the climax western hemlock, is dominant in the tree canopy and the hemlock is dominant in the understory (Jones and Annas 1978; Hirvonen et al. 1974; Klinka et al. 1979). On Saltspring, the CWHa Biogeoclimatic zone occurs on Mount Maxwell, Mt. Belcher, and the region between Mt. Tuam and Bruce Peak. *Pinus monticola* (western white pine), shore pine, *Taxus brevifolia* (western yew) and red alder may also occur, together with the western hemlock and coast Douglas fir. The shrub layer consists primarily of salal and Oregon grape (Hirvonen et al. 1974).

Detailed vegetation studies have been done for Saltspring Island. Hirvonen et al. (1974) differentiated eight different plant communities. The lichens of Saltspring were described by Bird and Bird (1973). Vegetation inventory and mapping were also part of the resource inventory for Saltspring Island (Clement 1983). A key to the vegetation units and a common species list, similar to the ones for Saltspring Island, have been published for Galiano, Valdes, and Thetis islands (Pattison and Karanka 1981).

Geology

Saltspring Island is underlain primarily by the sedimentary rocks of Upper Cretaceous age belonging to the Nanaimo Group. The Nanaimo Group is a conformable sequence of marine and nonmarine sediments for which five major depositional periods have been recognized (Muller 1977). These cycles show a "gradation from deltaic sandstones and or conglomerates through marine rhythmic beds of siltstone, sandstone and shale into either pure shale and mudstone or interbedded units richer in shale and mudstone" (Winsby 1973). These sediments reach a maximum thickness of approximately 4000 m on Saltspring Island. The Nanaimo Group occurs predominantly in the northern portion of Saltspring Island and consists of the following sedimentary rock types: sandstone, shale, siltstone, conglomerate, and very rarely, coal. The older, underlying formations outcrop only on Saltspring, Moresby, and Portland islands (Williams and Pillsbury 1958). The Tyee intrusion of Triassic-Jurassic metamorphosed igneous rocks occur north of the Fulford Valley, south of Cusheon Lake, and along the westerly slopes of Mount Maxwell. This formation is primarily altered granitoids and sericite schists. The major rock types are metagranodiorite, metaquartzdiorite, and metaquartz porphyry. South of the Fulford Valley the bedrock type is Palaeozoic metamorphosed sedimentary rock belonging to the greywacke-argillite formation of the Sicker Group. The principal rock types are meta-greywacke, argillite-schist, and marble. The Fulford Valley is underlain by the Nanaimo Group (Muller 1977).

The Trincomali anticline is the most outstanding structural feature of the southern Gulf Islands. The cliffs along this anticline dip seaward (Williams and Pillsbury 1958). On Saltspring Island there are two major structural trends resulting from post-Cretaceous deformation. The first trend is major folds and associated parallel faults at about 300°, and the second one is minor folds and oblique offset faults at about 325° (Winsby 1973).

Physiography

Saltspring Island is situated in the Nanaimo Lowland subdivision of the Georgia Depression physiographic unit of British Columbia (Holland 1976). Differential erosion of the Nanaimo Group bedrock has resulted in the dominant landform pattern of the Nanaimo Lowland. This pattern consists of low cuesta-like ridges separated by narrow valleys. The ridges are capped by the more resistant sandstones and conglomerates, whereas the valleys have been eroded out of the least resistant shales and mudstones, often along fault lines. The cuestas face easterly or westerly, depending upon the dip of the rock formation.

The southern portion of Saltspring Island is made up of more resistant metamorphosed igneous and sedimentary rocks, which is reflected in somewhat higher elevations. Baynes Peak, which belongs to the Nanaimo Group, is 595 m high. Mt. Tuam is 630 m high and Bruce Peak, the highest elevation on Saltspring Island, occurs at 698 m elevation. They both belong to the Sicker Group. The relief was further modified by glacial erosion and the deposition of a fairly thick mantle of glacial and glaciofluvial materials. The lakes are the result of glacial scouring (Williams and Pillsbury 1958; Holland 1976).

Soil parent materials

The soils of Saltspring Island are developed on many kinds of unconsolidated materials. Most of the soil parent materials found today were once transported and deposited by glaciers, rivers, lakes, and the sea since the last glacial time. Only a few soils have developed on recent fluvial materials, shorelines, and organic deposits. On sloping topography, the soils have developed on colluvium and glacial till deposits. Fig. 5 shows a generalized cross section of soil parent materials in relation to landscape position.

All the Gulf Islands were glaciated several times during the Pleistocene. The last major ice sheet occurred during the Vashon stage of the Fraser Glaciation. This ice sheet reached the Gulf Islands some time less than 25 000 years ago and attained a climax about 15 000 years ago (Mathews et al. 1970). During and after the retreat of the Vashon ice sheet, which was completed about 12 000 years ago (Mathews et al. 1970), marine waters entered the depressional areas and covered a large part of the present lowlands of the Gulf Islands, including Saltspring Island (Halstead 1968). The depression of the land relative to the sea was caused by the weight of the glaciers (Clague 1975). The islands have risen relative to the sea since

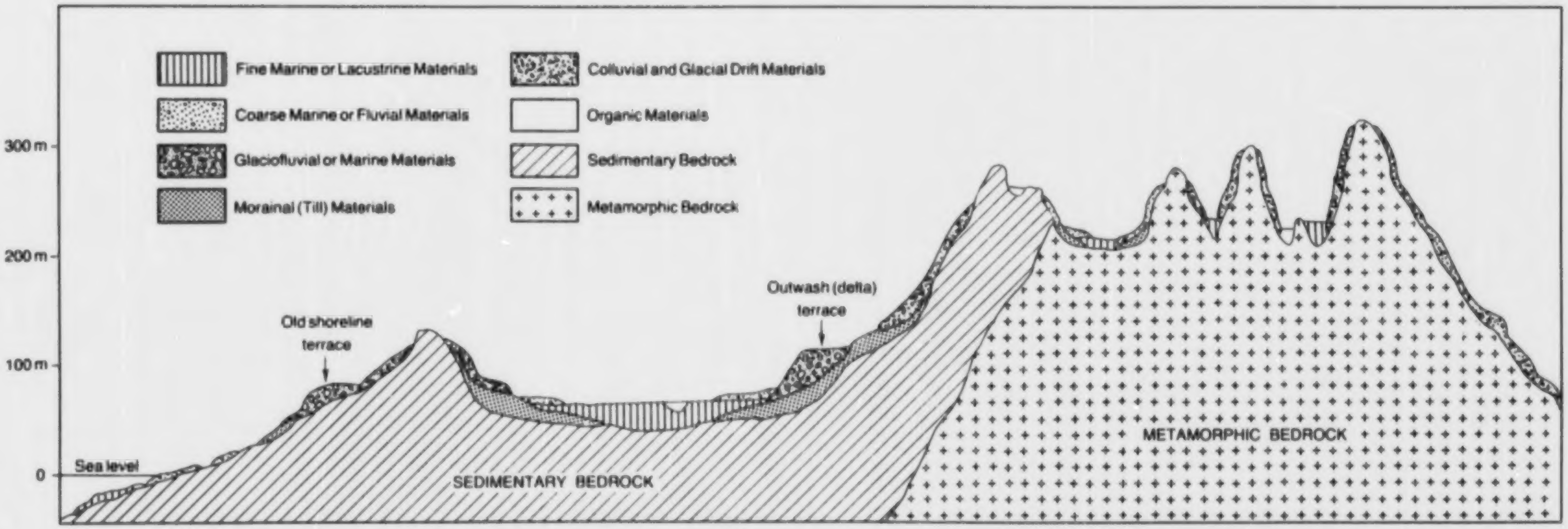
Fine Marine or Lacustrine Materials
Coarse Marine or Fluvial Materials
Glaciofluvial or Marine Materials
Morainal (Till) Materials
Colluvial and Glacial Drift Materials
Organic Materials
Sedimentary Bedrock
Metamorphic Bedrock
300 m
200 m
100 m
0
Sea level
Old shoreline terrace
Outwash (delta) terrace
SEDIMENTARY BEDROCK
METAMORPHIC BEDROCK

Figure 5. Generalized cross section of soil parent materials in relation to landscape position

retreat of the glaciers, so that now the highest marine deposits on the Gulf Islands are found approximately at a 100-m elevation above mean sea level. The deep fine to moderately fine textured marine materials were deposited in depressional areas and basins, well protected from wave action. These deposits form the parent materials of the Cowichan, Tolmie, and Fairbridge soils. Similar deep fine to moderately fine textured materials found at elevations of over 100 m were of lacustrine origin. Where these marine or lacustrine deposits are shallow over compact glacial till they form the parent materials of the Suffolk soil. Deep coarse to moderately coarse textured marine materials that were deposited in the sea or modified by the sea became the parent materials of the Beddis and Qualicum soils. They occur as shoreline deposits, bars, and terraces. Often they form shallow deposits over compact, glacial till (Trincomali soils) or over fine to moderately fine textured marine materials (Brigantine and Parksville soils), or over moderately fine textured marine materials overlying glacial till (St. Mary soils).

The thick mantle of till that was deposited during the last glaciation was subject to subsequent erosion after glaciation. In many upland areas, these till deposits have been eroded down to the underlying bedrock, except for small pockets or on protected side slopes. Deeper till deposits occur in the lowland areas. Only one till material was recognized on Saltspring Island. This is a coarse to moderately coarse textured, stony (gravelly), compact till, which is the parent material of the Mexicana soil. In places, this till is overlain by shallow marine deposits (Suffolk, Trincomali, and St. Mary soils).

During the retreat of the glaciers, glacial meltwater streams deposited coarse to moderately coarse textured materials to form terraces, benches, or deltas. These glaciofluvial deposits form the parent materials of the Beddis soils (low gravel content) and the Qualicum soils (high gravel content).

Soils that have developed on moderately coarse to medium textured shallow colluvial and glacial drift materials over bedrock are Saturna and Bellhouse (over sandstone bedrock), Galiano (over shale and siltstone bedrock), Haslam complex (over sandstone, siltstone, and shale bedrock intermixed), Salalakim (over conglomerate bedrock), and Musgrave and Rumsley (over metamorphic bedrock).

Recent fluvial (alluvial) deposits of medium to coarse texture are the parent materials of the Crofton soil. Organic soils occur around small lakes and in closed depressions. The only organic soil found on Saltspring Island consists of well-decomposed peat materials, which are the parent materials of the Metchosin soil. One anthropogenic soil (Neptune) was recognized, consisting of coarse textured materials mixed with shells and organic debris (Indian middens). Table 4 is a summary of the soils grouped by parent materials.

Table 4. Soils grouped by parent materials

Moderately fine to fine textured marine materials:

COWICHAN, FAIRBRIDGE, and TOLMIE

Medium to moderately fine textured marine materials over glacial till:

SUFFOLK

Coarse to moderately coarse textured marine or fluvial materials over moderately fine to fine textured marine materials:

BRIGANTINE and PARKSVILLE

Coarse to moderately textured marine or fluvial materials over moderately fine textured marine materials underlain by glacial till:

ST. MARY

Coarse to moderately coarse textured marine or fluvial materials over glacial till:

TRINCOMALI

Coarse to moderately coarse textured marine or fluvial materials:

BEDDIS and QUALICUM

Moderately coarse to medium textured morainal (glacial till) materials:

MEXICANA

Medium to coarse textured recent fluvial (alluvial) materials:

CROFTON

Moderately coarse to medium textured shallow colluvial and glacial drift materials over bedrock:

BELLHOUSE, GALIANO, HASLAM COMPLEX, MUSGRAVE, RUMSLEY, SALALAKIM, and SATURNA

Organic soil:

METCHOSIN

Anthropogenic soil:

NEPTUNE

PART 3. SURVEY AND MAPPING PROCEDURES

How the soils were mapped

Before the field mapping began, preliminary plotting of soil boundaries and areas assumed to have similar soils were marked in the office on aerial photographs. Boundaries between contrasting soils were mapped, using changes in visible landscape features and other indicators such as slope, bedrock exposures and shallow soils, vegetation, landform (for example, terraces, ridge crests, and escarpments), peatlands containing organic soils, and color tone indicating different drainage. Fieldwork involved checking these areas to determine the types of soils within them. Location of boundaries between contrasting soils were also checked, adjusted if necessary, and finalized on the aerial photographs either by visual examination or by digging and augering holes systematically on either side of them. During the 1980 field season, 1976 black and white (1:15 840) aerial photographs were used for the field mapping, whereas 1980 color (1:20 000) aerial photographs were used during the 1981 field season.

At each inspection (a ground examination to identify or verify the soil) of a given area, soil properties were recorded by noting external features such as site position, slope, aspect, elevation, stoniness, percentage of bedrock exposed, and vegetation. Then such properties as texture, drainage, depth to bedrock, root- and water-restricted layers, sequence of horizons, and coarse fragment content were recorded from soil pits, auger holes, or road cuts. A total of 2541 inspections were made during the fieldwork.

This type of survey procedure is appropriate to a survey intensity of level 2 (Mapping Systems Working Group 1981). Nearly all traverses were on foot and by vehicle, on an average 300 m apart. At least one soil inspection took place in 99% of the delineations (areas on the map). The average area represented by one inspection (inspection density) was 7.1 ha. Most all soil boundaries were checked in the field.

An existing list of soils based on the soil legend for the Gulf Islands and East Vancouver Island from previous surveys was used, modified, and updated. Several new soils were added to this list. The soils were given names from the areas where they were first found, plus symbols to denote the names on the aerial photographs. The final list of soils became the legend on the soil map. The soils were classified according to The Canadian System of Soil Classification (Canada Soil Survey Committee 1978). At the end of each field season, typical profiles of the major soils were described and sampled in detail. Once the fieldwork was completed and the soils were named, described, classified, and delineated on aerial photographs, the final map and legend production was begun. The soil map accompanying this report is at a scale of 1:20 000.

Reliability of mapping

Saltspring Island has a good system of roads that provides easy access to all lowland areas, particularly in the more heavily populated northern part of the island. At higher elevations and in the less densely populated southern half of the island there was less access and four-wheel drive vehicles were often necessary. Fieldwork involved traveling all the available roads and trails by motor vehicle. Areas inaccessible to motor vehicles were traversed by foot when the terrain was not too steep. Steep inaccessible areas were not checked. On average, two inspections per delineation were made on Saltspring Island, whereas five, or more, inspections per delineation were not uncommon for areas with complex soil materials and/or topography. It is obvious therefore that symbols within any delineation on the map do not describe accurately 100% of what is in that area. Mapping accuracy or reliability varies with access and complexity of soil parent materials, topography, depth to bedrock, and soil drainage.

Fig. 6 is a small-scale map of the location of all inspections and indicates the relative mapping accuracy for Saltspring Island. The inspection density reflects a combination of accessibility and complexity of the soil landscape. Based on the inspection density pattern in Fig. 6, the following two areas are identified, reflecting relative levels of map reliability:

1. Areas at elevations up to 100 m, with a high inspection density, have a relatively higher reliability of mapping.
2. Areas at elevations over 100 m, with a low inspection density, have a relatively lower reliability of mapping.

The soil map shows different areas that have certain ranges of soils and soil properties. The reliability or accuracy of these ranges varies from one location of the map to another. It is never 100%. Therefore, to determine the qualities of a soil at a particular location a site inspection must be made.

Soil series and map units

The soils are recognized, named, and classified in The Canadian System of Soil Classification (Canada Soil Survey

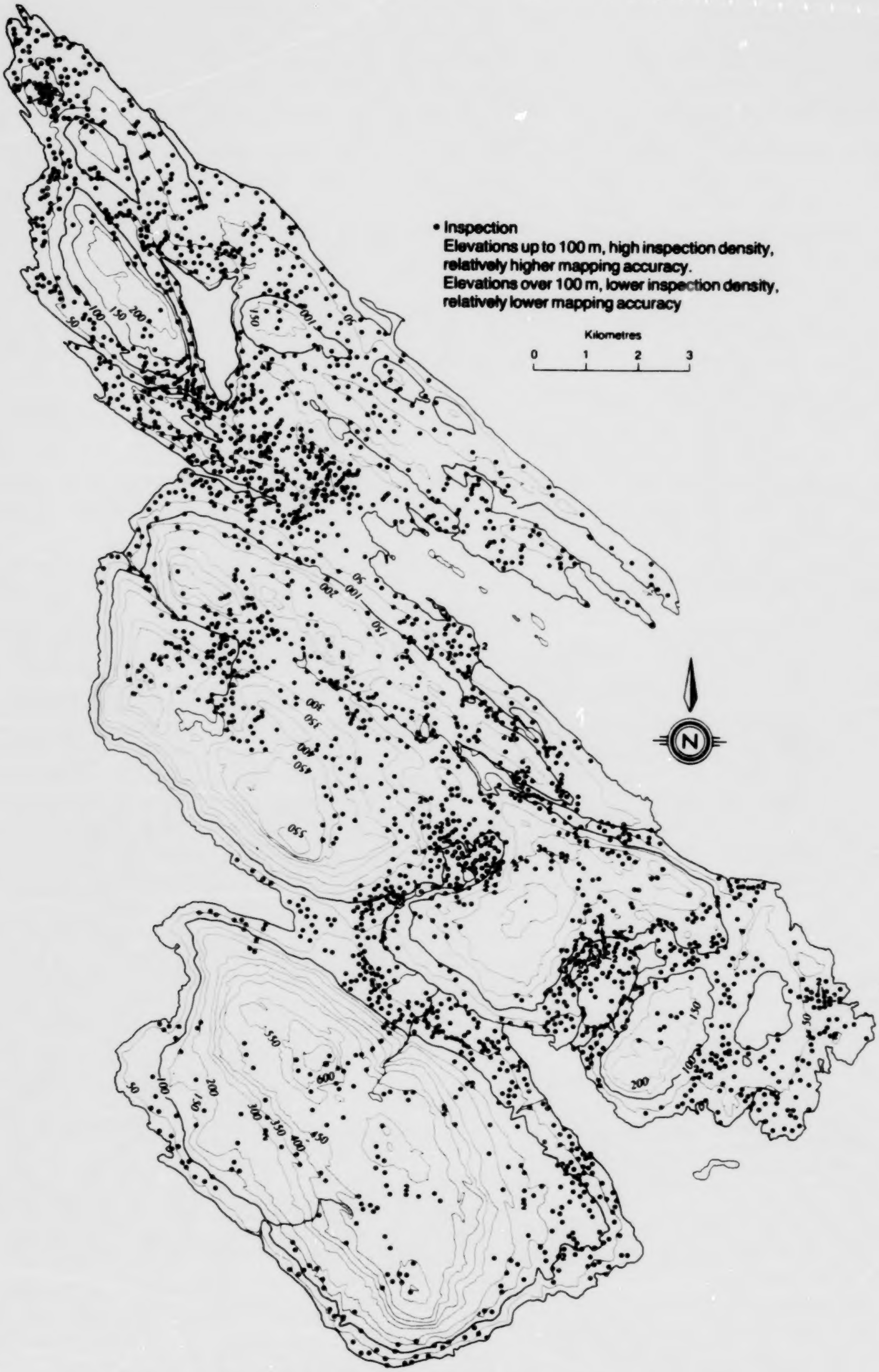
• Inspection
Elevations up to 100 m, high inspection density, relatively higher mapping accuracy.
Elevations over 100 m, lower inspection density, relatively lower mapping accuracy
Kilometres
0
1
2
3
N

Figure 6. Inspection density and relative mapping accuracy

Committee 1978) at the series level. Each named series consists of soils that have developed on similar parent materials and which are essentially alike in all major profile characteristics except for the texture of the surface. Soil properties that are definitive for the soil series are texture, drainage, coarse fragment content, contrasting materials, thickness and degree of expression of horizons (for example, Ah and Bt horizons), and lithology. There are 20 different soil series and one soil complex recognized on Saltspring Island (Table 4). In addition, there is one nonsoil unit recognized and mapped that consists dominantly of Rock Land (RO).

Variability in one or more soil properties is common. When this variability is frequent and consistent enough to be mapped and when it affects the use interpretations and management of the soil, it is expressed as a soil phase in the map symbol. For example, an area with Saturna soil for which bedrock occurs consistently within 50 cm from the surface is mapped as a very shallow lithic phase (STsl). The soil phases and variants used on Saltspring Island are listed in the map legend.

Soils are shown on the soil map either singly or grouped in map units. A map unit represents mappable portions of the soil landscape. Both soil and nonsoil (RO), called mapping individuals, occur as components in each map unit. A map unit contains one (called simple map unit) or more than one (called compound map unit) soil or nonsoil individual, plus a small proportion of a minor soil or nonsoil individual, called inclusions. The proportion of each of the component soils and nonsoil and the inclusions vary within defined limits for the map unit from one delineation to another. The map unit reflects the combined total variation of all delineations that contain the same symbol (Mapping Systems Working Group 1981). Inclusions can be limiting or nonlimiting in the use interpretations for the map unit. For example, 0-25% bedrock exposures in the Saturna (ST) map unit is a limiting inclusion. However, an example of a nonlimiting inclusion is 0-35% of an imperfectly drained Brigantine (BE) soil in the poorly drained Parksville (PA) map unit. Consequently, the proportion of the map unit with limiting inclusions is always lower (usually between 0 and 25%) compared to the nonlimiting inclusions (usually between 0 and 35%). A soil can be simultaneously the dominant component of one map unit (both in single and in compound map units), or the subdominant component of another map unit, and a minor component or inclusion in a third and fourth map unit. An example of such a soil is Cowichan (CO): dominant soil in CO simple map unit, dominant soil in CO-FB compound map unit, and subdominant soil in HA-CO map unit and mentioned as minor components (inclusions) in the FB, BE-TL, and TL map units.

The map units are described in the legend and are colored on the map according to parent materials of the dominant and subdominant soil. Simple map units with dominant soils developed on moderately fine to fine textured marine materials are colored shades of blue (Brigantine, Cowichan, Fairbridge, Parksville, and Tolmie). Map units with dominant soils developed on fluvial parent materials are colored shades of red (Crofton, Beddis, and Qualicum). Shades of yellow and light orange are used for simple map units with dominant soils developed on colluvial materials (Bellhouse, Galiano, Haslam soil complex, Musgrave, Rumsley, Salalakim, and Saturna). Shades of intense green are used for map units whose dominant soils have compact till in the subsoil (Mexicana, St. Mary, Suffolk, and Trinicomali). The rock-dominated simple map unit is colored gray brown. The organic soil-dominated map unit is colored brown (Metchosin), whereas the anthropogenic soil-dominated map unit is colored purple (Neptune). Colors for compound map units are made up of a combination of the color for the dominant and the subdominant soils in the map unit.

Each of the 41 different map units recognized on Saltspring Island are listed in Table 5 with the number of delineations and aerial extent. Table 5 also lists land types that are recognized on Saltspring Island. These land types include MD for made land, TF for tidal flat, and W for small lakes (see also map legend). Land types are distinguished from map units by the lack of a slope symbol.

For map units, such as Rock (RO), Neptune (NT), and Metchosin (MT), some areas on the map (delineations) are too small to be mapped separately. These areas are indicated by on-site symbols. Other on-site symbols are used on the map to indicate site-specific information such as gravel pits, shale pits, springs, quarries, escarpments, gullies, rock or stone piles, and water. A list of on-site symbols is shown on the map legend.

Table 5. Number of delineations and aerial extent of each map unit and land type on Saltspring Island

Map unit		Number of delineations	Aerial extent (ha)	Proportion of total area (%)
Symbol	Name			
BD	Beddis	30	218	1.2
BE	Brigantine	89	486	2.6
BE-TL	Brigantine-Tolmie	13	120	0.6
BH	Bellhouse	6	97	0.5
CF	Crofton	54	369	2.0
CO	Cowichan	38	239	1.3
CO-FB	Cowichan-Fairbridge	5	272	1.5
FB	Fairbridge	31	213	1.1
GA	Galiano	28	412	2.2
GA-ME	Galiano-Mexicana	6	158	0.9
HA	Haslam	81	1408	7.6
HA-BE	Haslam-Brigantine	15	225	1.2
HA-CO	Haslam-Cowichan	11	123	0.7
HA-QU	Haslam-Qualicum	11	135	0.7
ME	Mexicana	60	1549	8.4
ME-TR	Mexicana-Trincomali	20	344	1.9
MG	Musgrave	23	394	2.1
MG-ME	Musgrave-Mexicana	21	2109	11.4
MT	Metchosin	105	167	0.9
NT	Neptune	3	6	0.1
PA	Parksville	33	108	0.6
PA-TL	Parksville-Tolmie	11	79	0.4
QU	Qualicum	55	520	2.8
RO	Rock	62	410	2.2
RO-HA	Rock-Haslam	10	37	0.2
RO-MG	Rock-Musgrave	33	1176	6.3
RO-RY	Rock-Rumsley	36	683	3.7
RO-SL	Rock-Salalakim	4	102	0.5
RO-ST	Rock-Saturna	25	332	1.8
RY	Rumsley	59	1567	8.4
RY-ME	Rumsley-Mexicana	21	935	5.0
SL	Salalakim	6	50	0.3
SL-ME	Salalakim-Mexicana	10	298	1.6
SM	St. Mary	19	454	2.4
SM-HA	St. Mary-Haslam	4	76	0.4
SM-ME	St. Mary-Mexicana	7	115	0.6
ST	Saturna	72	940	5.1
ST-ME	Saturna-Mexicana	4	286	1.5
SU	Suffolk	21	200	1.1
TL	Tolmie	74	330	1.8
TR	Trincomali	39	446	2.4

Table 5. Number of delineations and aerial extent of each map unit and land type on Saltspring Island (concluded)

Land type		Number of delineations	Aerial extent (ha)	Proportion of total area (%)
Symbol	Name			
MD	Made land	7	66	0.4
TF	Tidal flat	9	73	0.4
W	Small lakes	20	292	1.6

PART 4. DESCRIPTION OF SOILS AND MAP UNITS

How the soils and map units were described

This section contains information about soil and map unit properties. It describes how the basic units, the soils, are related and grouped together to form map units, which are then related to landscape properties. Each soil description is followed by map unit descriptions for which that soil is a dominant component.

Descriptions for each of the 20 different soils and one soil complex on Saltspring Island include sections on range in soil characteristics, water regime, variability in soil properties, similar soils to the ones described, natural vegetation, and land use of the soil.

In addition to the range in soil textures that is definitive for the soil, the section on ranges in soil characteristics also includes data on observed ranges and estimated mean values of soil properties that relate to depth and thickness parameters and for the coarse fragment content. Detailed profile descriptions for the most commonly occurring soils can be found in the Appendix.

The conventions used for the range in soil characteristics section are as follows:
- mean values (usually estimated, occasionally calculated) for soil characteristics are followed by the observed range in values in parentheses (for example, depth of solum: 85 cm (60-100 cm)).
- use of parentheses other than for indicating the range in values refer to occasionally occurring soil characteristics (for example, surface soil thickness or soil texture).
- LS,SL,L, and so on are the short forms for soil textures explained in the map legend.
- CF is the short form for coarse fragments.

Further conventions used for soil descriptions or the class limits for characteristics such as slope can be found in The Canadian System of Soil Classification (Canada Soil Survey Committee 1978) or in the map legend. Definitions of soil terms not explained in this report can be found in the Glossary of Terms in Soil Science (Canadian Society of Soil Science 1976).

Following each soil description are the map unit descriptions for which that soil is a dominant component. Map unit descriptions specify the proportion of dominant, subdominant, and minor (inclusion) soil or nonsoil components in the map unit, the drainage of these soil components, and the sections on landform and occurrence and on distribution and extent. The landform and occurrence section describes the landscape position, the surface form, the dominant slopes, and the elevation for each map unit. The distribution and extent section describes the geographic location of the map unit, the number and approximate size and shape of its delineations, and the aerial extent of the map unit.

In the following sections soils and map units are described alphabetically. Detailed profile descriptions and analyses for the most commonly occurring soils are presented in alphabetical order in the Appendix.

BEDDIS SOIL AND MAP UNITS

Beddis soil (BD)

Beddis soils are well to rapidly drained soils that have developed on deep (>150 cm) fluvial, marine, or eolian deposits of loamy sand to sandy loam texture. Coarse fragment content <20%. The profile description and analyses of a selected Beddis soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil : Ah 0-10 cm or Bm 0-35 cm (Ap 10-15 cm)
Texture, surface soil (0-30 cm) : LS-SL(S)
Texture, subsurface soil : LS-SL(S)
Depth of solum (A and B horizons) : 85 cm (60-100 cm)
Depth of soil (A, B, and C horizons): >150 cm
Depth to bedrock : >150 cm
Depth and type of restricting layer : Absent
Effective rooting depth : 85 cm (40-110 cm)
CF content and type (0-30 cm) : 5%(0-10%), gravelly and angular gravelly
CF content and type, subsurface : 10% (0-25%), gravelly
Perviousness : Rapid
Percolation : Rapid
Soil classification : Orthic Dystric Brunisol

Water regime

Beddis soils are well to rapidly drained with water tables remaining below 100 cm throughout the year. The soil remains moist during the winter months but is quickly becoming droughty in dry periods during the summer.

Variability

Several variations in the Beddis soil profile occur. The surface may be gravelly or angular gravelly with coarse fragment content exceeding 20% (BDg). When the Ap or Ah horizon is thicker than 10 cm, the Beddis soil has been mapped as BDa. Occasionally a podzolic Bf horizon is present, which will change the classification into an Orthic Humo-Ferric Podzol. In a few small delineations imperfectly drained variations of the Beddis soil occur and are indicated by BDid. The C horizon may occasionally have a massive structure of compact sand that is more slowly permeable than the overlying materials but which is not enough to create perched water table conditions.

Similar soils

Beddis soils are similar to Qualicum soils, which have a higher (> 20%) coarse fragment content throughout the profile.

Natural vegetation

The natural vegetation is characterized by coast Douglas fir, grand fir, occasionally shore pine, and scattered Pacific madrone. The understory consists of salal, western bracken, and Oregon grape. Western hemlock occurs on some sites with a northerly aspect.

Land use

Most Beddis soils have a tree cover. Occasionally, small areas have been cleared over the years for agricultural purposes, mainly for pasture and hay crops. The soils are very droughty, fertility is low,soil reaction is strongly acid (pH 5.1-5.5), and the base exchange is low. With improvements such as irrigation and high fertilizer inputs, these soils have good potential for producing a range of annual crops and tree fruits. Currently, forestry represents their most common use.

Map units

Only one Beddis map unit is recognized, a simple map unit in which Beddis is the dominant soil.

Beddis map unit (BD)

The Beddis map unit consists dominantly (80-100%) of the well to rapidly drained Beddis soils. The map unit may include up to 20% of similar textured and deep rapid to well drained soils, having a gravelly and cobbly coarse fragment content of

20-50% (Qualicum soils). The inclusions of Qualicum soils somewhat limit the land use possibilities and use interpretations for this map unit because of the higher coarse fragment content.

Landform and occurrence

The Beddis map unit occurs as narrow, discontinuous terraces along drainageways and as old beach deposits, on gently to moderately sloping (6-15%) terrain, and occasionally on strongly sloping (16-30%) terrain. Elevation ranges from 0 to 150 m. The Qualicum soils occur at random in the Beddis delineations.

Distribution and extent

Beddis is a minor map unit. It has been mapped as 30 small- and medium-sized delineations throughout the map area. This map unit occupies 218 ha (1.2% of total map area).

BELLHOUSE SOIL AND MAP UNITS

Bellhouse soil (BH)

Bellhouse soils are rapidly to well drained soils that have developed on shallow colluvial and glacial drift materials of gravelly sandy loam to gravelly loamy sand texture over fractured or smooth unweathered sandstone bedrock. On Saltspring Island, all delineations with Bellhouse soil have bedrock within 50 cm. Coarse fragment content varies between 10 and 45%. The soil has a dark-colored Ah horizon at least 10 cm thick that is high in organic matter content. The profile description and analyses of a selected Bellhouse soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil : Ah 15 cm (10-25 cm)
Texture, surface soil (0-30 cm) : SL-LS
Texture, subsurface soil : SL-LS
Depth of solum (A and B horizons) : 35 cm (10-50 cm)
Depth of soil (A, B, and C horizons): 40 cm (10-50 cm)
Depth to bedrock : 40 cm (10-50 cm)
Depth and type of restricting layer : Absent
Effective rooting depth : 30 cm (10-40 cm)
CF content and type (0-30 cm) : 10-25%, channery and gravelly

CF content and type, subsurface : 15-45%, channery and gravelly
Perviousness : Rapid to moderate
Percolation : Rapid to moderate
Soil classification : Orthic Sombric Brunisol

Water regime

Bellhouse soils are rapidly to well drained. The soil remains moist throughout the winter months but is droughty from late spring to late fall. After infiltration, excess water drains freely and rapidly on top of the underlying sloping bedrock to lower areas.

Variability

The most important variation in the Bellhouse profile regarding use is the depth to bedrock. All six delineations of this soil on Saltspring Island have bedrock within 50 cm and are mapped as Bellhouse very shallow lithic phase (BHsl). Occasionally, the Ah horizon is less than 10 cm thick (Orthic Dystric Brunisol) or a podzolic Bf horizon is present (Sombric Humo-Ferric Podzol).

Similar soils

Bellhouse soils are similar to Saturna soils, which have thinner Ah or Ap horizons (0-10 cm). Saturna soils are found on all aspects, whereas the Bellhouse soils are more restricted to southerly and southwesterly aspects.

Natural vegetation

The natural vegetation is quite distinctive and consists of scattered clumps of Garry oak, coast Douglas fir, and Pacific madrone. The ground cover is predominantly grasses, common gorse, and broom. Garry oak is a unique species, restricted to the warm and dry southerly and southwesterly aspects. Tree growth is often stunted from lack of moisture.

Land use

The restriction of Bellhouse soils on Saltspring Island to its natural vegetation and limited sheep grazing is mainly because of the shallow soil to bedrock, topographic limitations, and droughtiness.

Map units

The Bellhouse soil occurs in one simple map unit on Saltspring Island, the Bellhouse (BHsl) map unit.

Bellhouse map unit (BH)

The Bellhouse map unit consists dominantly (75-100%) of the rapidly to well drained Bellhouse soil with bedrock occurring within 50 cm from the surface. The map unit may include up to 25% of sandstone bedrock exposure (Rock), which is a limiting factor for use interpretations.

Landform and occurrence

The Bellhouse map unit usually occurs in areas with flat-lying or slightly dipping unweathered sandstone bedrock with rock outcrops occurring at random. They are found on a southerly to southwesterly aspect under grass and Garry oak vegetation. Topography ranges from moderate to very strong slopes (10-45%).

Distribution and extent

The Bellhouse map unit is a minor one on Saltspring Island with only six small-to medium-sized delineations mapped, from which four occur in the upland area between St. Mary Lake and Dock Point (Vesuvius Bay). Two delineations occur near Beaver Point. This map unit occupies an area of 97 ha (0.5% of total map area).

BRIGANTINE SOIL AND MAP UNITS

Brigantine soil (BE)

Brigantine soils are imperfectly drained soils that have between 30 and 100 cm of a loamy sand to sandy loam overlay by marine or fluvial origin over deep (> 100 cm) silty clay loam to silty clay marine deposits that are usually stone free. The profile description and analyses of a selected Brigantine soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil : Ah 0-10 cm (Ap 10-15 cm)
Texture, surface soil (0-30 cm) : SL-L
Texture, subsurface soil : LS-SL, deeper SiCL-SiC
Thickness of overlay material and solum depth (A and B horizons) : 80 cm (30-100 cm)
Depth of soil (A, B, and C horizons): >100 cm
Depth to bedrock : >100 cm
Depth and type of restricting layer : 80 cm (30-100 cm), fine textured subsoil, often massive structured

Effective rooting depth : 80 cm (30-100 cm)
CF content and type (0-30 cm) : 0-10%, gravelly and angular gravelly
CF content and type, subsurface : 0-5%, gravelly
Perviousness : Moderate to slow
Percolation : Rapid in surface 80 cm, very slow below 80 cm
Soil classification : Gleyed Dystric Brunisol

Water regime

Brigantine soils are imperfectly drained with seasonal fluctuations in the water table. They are saturated to about 60 cm from the surface during the winter months. Seepage water maintains the subsoil in a moist condition throughout the rest of the year. Droughty conditions may occur during the summer when the water table drops to below 75 cm of the surface. Perched water table conditions may occur above the fine textured subsoil.

Variability

Variations in the Brigantine soil profile occur. The surface may be gravelly with coarse fragment content exceeding 20% (BEg). Occasionally, angular colluvial materials may be mixed in with the surface soil. When the depth to the fine textured subsoil is between 100 and 150 cm, the soil has been mapped as a deep phase (BEd). When the Ap or Ah horizon is thicker than 10 cm, the Brigantine soil has been mapped as BEa.

Similar soils

Brigantine soils are better drained than the poorly drained Parksville soils. Shallow Brigantine soils over compact till materials within 100 cm of the surface have been mapped as St. Mary (SM) soils. Soils with coarse to moderately coarse textured overlay materials thicker than 150 cm have been classified and mapped as Beddis or Qualicum soils, depending on the coarse fragment content.

Natural vegetation

The natural vegetation consists of western red cedar, red alder, and coast Douglas fir. The understory includes western sword fern, salal, and western bracken.

Land use

The Brigantine soils on Saltspring Island are being used for pasture and hay crops and for growing trees. For agricultural purposes, germination is slow in the spring and the soil is strongly acid (pH 5.1-5.5). The upper horizons have a moderately low moisture-holding capacity. The soil has low inherent fertility. Consequently, large amounts of fertilizer are required to produce a good crop. The Brigantine soil can be improved with irrigation and subsurface drainage to one of the better agricultural soils, producing a wide range of crops and tree fruits.

Map units

Being one of the most frequently mapped soils on Saltspring Island, Brigantine soils occur in several map units. In addition to the simple map unit BE, Brigantine soils have also been mapped as the dominant soil in the Brigantine - Tolmie (BE-TL) map unit. Brigantine is a subdominant soil in the Haslam - Brigantine (HA-BE) map unit, which is described under Haslam (HA). In addition, Brigantine is a minor soil in the Parksville (PA) map unit.

Brigantine map unit (BE)

The Brigantine map unit consists dominantly (70-100%) of imperfectly drained Brigantine soils. The map unit includes areas of poorly drained soils (0-30%) developed on similar parent material sequence (Parksville). These poorly drained soils are the limiting factor for use interpretations for this map unit.

Landform and occurrence

The Brigantine map unit occurs on very gentle to gentle slopes (2-9%) as narrow areas surrounding depressional basins and draws that are occupied by poorly drained soils, usually Parksville soils but occasionally Tolmie or Cowichan soils. Parksville soils occur in the lowest landscape positions as small unmappable inclusions (0-30%) in most BE delineations. Elevation usually ranges from 0 to 100 m.

Distribution and extent

The Brigantine map unit is a major one. It has been mapped as 89 small-sized, often narrow, delineations throughout Saltspring Island, 19 of which have been mapped with the deep phase (BEd), 13 with the gravelly phase (BEg), and 8 with the sombric variant (BEa). It occupies 486 ha (2.6% of total map area).

Brigantine - Tolmie map unit (BE-TL)

The Brigantine soil dominates this map unit (50-75%). Map unit also contains 25-50% of poorly drained soils developed on deep silt loam to silty clay marine deposits that are usually stone free (usually Tolmie soils but occasionally Cowichan soils). These poorly drained soils are the limiting factor for use interpretations for this map unit.

Landform and occurrence

The Brigantine - Tolmie (BE-TL) map unit occurs on very gentle to gentle slopes (2-9%) as narrow areas surrounding depressional basins and draws that are occupied by poorly drained Tolmie (Cowichan) soils. Tolmie (Cowichan) soils occupy the lowest landscape positions as significant portions (25-50%) of the map unit. Elevation usually ranges between 0 and 100 m.

Distribution and extent

The Brigantine-Tolmie map unit has been mapped less frequently than BE map units and has 13 relatively small delineations throughout Saltspring Island. It occupies 120 ha (0.6% of total map area).

COWICHAN SOIL AND MAP UNITS

Cowichan soil (CO)

Cowichan soils are poorly drained soils that have developed on deep (>100 cm) silty clay loam to silty clay marine deposits that are usually stone free. The soil is well developed, has a dark-colored surface horizon, a leached (Aeg) horizon, and a well-developed Btg horizon. The profile description and analyses of a selected Cowichan soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah or Ap 10-30 cm
Texture, surface soil (0-30 cm)	: SiL, SiCL
Texture, subsurface soil	: SiCL - SiC
Depth of solum (A and B horizons)	: 80 cm (65-100 cm)
Depth of soil (A, B, and C horizons)	: >100 cm
Depth to bedrock	: >100 cm
Depth and type of restricting layer	: 45 cm (30-60 cm); fine textured Btg horizon or subsoil
Effective rooting depth	: 45 cm (30-60 cm)

CF content and type (0-30 cm)	: 0-5%, gravelly
CF content and type, subsurface	: 0-5%, gravelly
Perviousness	: Slow
Percolation	: Slow
Soil classification	: Humic Luvic Gleysol

Water regime

The Cowichan soils are poorly drained soils that have distinct to prominent mottles within 50 cm of the surface. They are wet for long periods throughout the year with water tables at or within 30 cm of the surface during the winter months (December to March). The water table drops quickly below 60 cm of the surface in early April and remains there until early November. Water tables in the Cowichan soils fluctuate rapidly over short periods of time after rainfall or drought. Perched water table conditions occur temporarily on top of the fine textured Btg horizon. These soils receive runoff water from the surrounding landscape.

Variability

Some variations in the Cowichan soil occur. Occasionally, a well-decomposed organic surface layer is present with a thickness varying between 5 and 40 cm, as indicated by COp. One area located northwest of St. Mary Lake had very poorly drained Cowichan soils with less pronounced profile development and frequent thin layers of well-decomposed organic material in its profile. This has been indicated by COt. The depth of some of the marine deposits exceeded 4.5 m in the Fulford Valley.

Similar soils

Cowichan soils are similar to the poorly drained Tolmie soils. The latter often have a less uniform texture, lack the eluviated (Ae) horizon and Btg horizon, and are usually more distinctly mottled in the subsoil than the Cowichan soils. The Cowichan soils are somewhat related to the poorly drained alluvial Croften soils that are much more variable in texture than the Tolmie soils. The imperfectly drained member of the Cowichan soil is the Fairbridge soil.

Natural vegetation

Nearly all the larger areas of Cowichan soils have been cleared for agriculture. The natural vegetation on the remaining areas, which are often small and narrow, consists of red alder and western red cedar, and frequently consists of bigleaf maple. The shrubs are represented by patches of salmonberry and hardhack. The herb layer is characterized by western sword fern, American skunk cabbage, rushes, sedges, and horsetail.

Land use

Cowichan soils represent one of the most important agricultural soils on Saltspring Island. The surface soil is well supplied with organic matter and nitrogen. They are strongly acid (pH 5.1-5.5) soils. Poor drainage is the major limitation for growing a large variety of agricultural crops on these soils, and for this reason they are mainly used for pasture and hay crops, particularly on Saltspring Island. With improved drainage, these soils are good for growing a wide variety of crops, including vegetables, berries, and small fruits.

Map units

The Cowichan soil occurs in several map units. It is the dominant soil in the simple Cowichan (CO) map unit and in the compound Cowichan - Fairbridge (CO-FB) map unit. It has also been mapped as a subdominant soil in the Haslam - Cowichan (HA-CO) compound map unit, which is described under Haslam. In addition, Cowichan soils occur as minor soils in the Brigantine - Tolmie (BE-TL), Fairbridge (FB), Parksville - Tolmie (PA-TL), and Tolmie (TL) map units.

Cowichan map unit (CO)

The Cowichan map unit consists dominantly (65-100%) of the poorly drained Cowichan soils with up to 35% of similar, poorly drained, less uniform textured Tolmie soils that often have coarse textured materials in pockets or thin layers. The inclusions of Tolmie soil are not limiting the use interpretations for this map unit.

Landform and occurrence

The Cowichan map unit is found in depressional to very gently sloping (0-5%) landscape positions such as depressions, basins, and swales where ancient sea levels were able to deposit large amounts of fine textured sediments. The Cowichan map unit also occurs in between bedrock ridges with shallow colluvial soils, often receiving runoff water from the surrounding landscape. Tolmie soils occur at random in the form of many small inclusions not exceeding 35% of the map unit. Elevations usually range from 0 to 100 m.

Distribution and extent

The Cowichan map unit has 38 delineations, most of which occur in the northern part of the island. Most delineations occupy small- to medium-sized areas, except for a large-sized delineation near Fernwood and one near Beaver Point. Two delineations with COp soils were mapped and one with COt soils northwest of St. Mary Lake was mapped. The Cowichan (CO) map unit occupies an area of 239 ha (1.3% of total map area).

Cowichan - Fairbridge map unit (CO-FB)

The Cowichan - Fairbridge map unit consists dominantly (50-65%) of the poorly drained Cowichan soils with significant portions (35-50%) of similar but imperfectly drained Fairbridge soils. The Fairbridge soils do not limit the use interpretations of this map unit. In fact, they are less limiting for different uses than the Cowichan soils.

Landform and occurrence

The Cowichan - Fairbridge map unit is found on nearly level to gently sloping (0-9%) landscape positions of the Fulford Valley. Ancient seas were able to deposit large amounts of fine textured sediments. In Fulford Valley the C horizon was observed to extend beyond 4.5 m in depth. In this landscape position, the Cowichan and Fairbridge soils are intimately mixed, where the poorly drained Cowichan soils occupy the lower landscape positions (level to depressional areas) and the Fairbridge soils occupy the higher, imperfectly drained, gently sloping landscape positions. Elevation usually ranges from 0 to 100 m.

Distribution and extent

The Cowichan - Fairbridge map unit occurs only in the Fulford Valley in the form of five large-sized delineations. This map unit occupies an area of 272 ha (1.5% of total map area).

CROFTON SOIL AND MAP UNITS

Crofton soil (CF)

Crofton soils are poorly to very poorly drained soils that have developed on recent fluvial (alluvial) stratified deposits of silt loam to fine sandy loam texture, usually overlying gravelly loamy sandy to gravelly sand materials at variable depths (between 30 and 120 cm). Coarse fragment content is 20%, but it is commonly between 20 and 50% in the coarse textured subsoil materials if present. Soils have weak or no profile development. The profile description and analyses of a selected Crofton soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil : Ah 10-25 cm (Ah 0-10 cm)
Texture, surface soil (0-30 cm) : SiL-FSL
Texture, subsurface soil : Sil-FSL; deeper LS-S
Thickness of overlay materials : 60 cm (30-120 cm)
Depth of solum (A and B horizons) : 50 cm (30-100 cm)
Depth of soil (A, B, and C horizons) : >120 cm
Depth to bedrock : >120 cm
Depth and type of restricting layer : 60 cm (30-120 cm), coarse textured materials if present
Effective rooting depth : 50 cm (30-70 cm)
CF content and type (0-30 cm) : 10% (0-20%), gravelly
CF content and type, subsurface : 10% (0-20%); but 20-50% in coarse textured materials; gravelly
Perviousness : Slow
Percolation : Moderate to slow (3.8-21 min/cm)
Soil classification : Orthic Humic Gleysol

Water regime

Crofton soils are poorly to very poorly drained with high groundwater tables usually near the surface for most of the year. They have distinct to prominent mottles within 50 cm of the surface. Average water table depth during the driest part of the summer is at approximately 50 cm (15-95 cm). As bottomland soils, they receive large quantities of runoff water from the surrounding landscape, as well as seepage water.

Variability

Crofton soils, in being alluvial soils with stratified materials, are highly variable in texture and in depth to the underlying coarse textured materials. The latter occurs in approximately half the number of delineations. Usually, a deep (10-25 cm) Ah horizon is present. The most common soil classification therefore is Orthic Humic Gleysol. Occasionally, a well-decomposed organic surface layer (Oh) is present but not consistently enough to map. In areas where soil development is absent, Crofton soils are classified as Rego Humic Gleysols. Without the deep Ah horizon, the soil is classified as an Orthic Gleysol. In many delineations, minor areas of imperfectly drained Crofton soils occur. These variations in soil classification and drainage occur frequently at random within delineations. They could neither be mapped separately nor indicated by a soil phase symbol.

Similar soils

Crofton soils are the only alluvial soils found on Saltspring Island. Crofton soils without the coarse textured subsoil materials resemble Cowichan and Tolmie soils. However, Crofton soils have more variable textures of coarser materials, and are often more poorly drained than the Cowichan and Tolmie soils.

Natural vegetation

The natural vegetation consists of western red cedar, red alder, and bigleaf maple. The ground cover includes western sword fern, rushes, sedges, American skunk cabbage, horsetail, and western bracken.

Land use

The current land use of the Crofton soils is restricted to its natural vegetation. Some selective logging took place about 60 years ago. These soils are best for growing deciduous trees. Clearing for agricultural purposes has not occurred because of the high water tables, the risk of flooding, and the often narrow delineations (drainageways and stream channels).

Map units

The Crofton soils only occur in one simple map unit on Saltspring Island, the Crofton (CF) map unit.

Crofton map unit (CF)

The Crofton map unit consists dominantly (75-100%) of the poorly to very poorly drained Crofton soils with up to 25% of similar but imperfectly to moderately well drained soils. The imperfectly to moderately well drained inclusions are not limiting the use interpretations for the map unit.

Landform and occurrence

The Crofton map unit is usually found on floodplains, along stream channels, and at the bottom of creek beds. It also occurs along narrow, continuous drainage channels with intermittent flow on gentle to moderate slopes (2-15%), frequently in between bedrock ridges of the upland areas on Saltspring. The alluvial processes are active, resulting in deposition and erosion of sediments that cause changes in soil texture. The better drained inclusions occur at random. The map unit occurs at all elevations.

Distribution and extent

The Crofton map unit occurs frequently on Saltspring Island with 54 delineations. Approximately 40 delineations have been mapped in the upland areas of the southern part of Saltspring Island. This map unit occupies an area of 369 ha (2.0% of total map area).

FAIRBRIDGE SOIL AND MAP UNITS

Fairbridge soil (FB)

Fairbridge soils are imperfectly drained soils that have developed on deep (> 100 cm) silt loam to silty clay loam marine deposits that are usually stone free. Concretions of iron oxide may be present throughout the profile. The profile description and analyses of a selected Fairbridge soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah 0-10 cm (Ap 10-15 cm)
Texture, surface soil (0-30 cm)	: SiL-L
Texture, subsurface soil	: SiL-SiCL (SiC)
Depth of solum (A and B horizons)	: 70 cm (50-100 cm)
Depth of soil (A, B, and C horizons)	: > 100 cm
Depth to bedrock	: > 100 cm
Depth and type of restricting layer	: 70 cm, fine textured BCg or Cg horizon
Effective rooting depth	: 45 cm
CF content and type (0-30 cm)	: 0-5%, gravelly
CF content and type, subsurface	: 0-5%, gravelly
Perviousness	: Slow
Soil classification	: Gleyed Dystric Brunisol

Water regime

Fairbridge soils are imperfectly drained soils with distinct to prominent mottles between 50 and 100 cm. They are saturated to about 60 cm from the surface during the winter months, often by a perched water table. The water table drops quickly in spring and droughty conditions may even prevail during extended dry periods in the summer.

Variability

Fairbridge soils with cultivated Ap surface horizons that are thicker than 10 cm are indicated by FBa. A few delineations with shallow (50-100 cm) Fairbridge soils over bedrock are phased as FB1. Also, the morphology of Fairbridge soils can be variable. A leached (Ae) horizon may occur under the Ah (Ap) horizon or under a Bm horizon (Gleyed Eluviated Dystric Brunisol). Occasionally, a Btg horizon is present below an Ae or Bm horizon (Gleyed Brunisolic Gray Luvisol). Both of these variations in morphology were too inconsistent to be mapped.

Similar soils

Fairbridge soils are similar to the Suffolk soils, which are shallow over compact till within 100 cm. The poorly drained member of the Fairbridge soil is the Cowichan soil.

Natural vegetation

The natural vegetation consists of red alder, western red cedar, coast Douglas fir, and bigleaf maple, with an understory of western sword fern, salal, nettles, and western bracken.

Land use

Like the Cowichan soils, most of the areas in Fairbridge soils on Saltspring Island have been cleared for agriculture. Fairbridge soils are considered to be one of the better agricultural soils on the island. They are being used for hay production and pasture, but they could be used for a large range of crops upon improvement. Because of droughty conditions during the summer, irrigation is recommended for maximum production. The soil reaction is usually strongly to moderately acid (pH 5.1-6.0), but occasionally it is very strongly acid (pH 4.5-5.0). The fertility level and organic matter content of Fairbridge soils are relatively low. Soil structure deterioration such as compaction and puddling results after repeated cultivation but can be controlled with good soil management techniques.

Map units

The Fairbridge soil occurs as the dominant soil in the Fairbridge (FB) simple map unit. It is a subdominant soil in the Cowichan - Fairbridge (CO-FB) compound map unit, which is described under Cowichan.

Fairbridge map unit (FB)

The Fairbridge map unit consists dominantly (75-100%) of the imperfectly drained Fairbridge soils with up to 25% inclusions of similar but poorly drained Cowichan or Tolmie soils. These poorly drained soils are limiting the use interpretations for this map unit.

Landform and occurrence

This map unit occurs on undulating topography with very gentle to gentle slopes (2-9%), in which minor areas of the poorly drained soils occupy the lower landscape positions at random. Elevations are usually between 0 and 100 m.

Distribution and extent

The Fairbridge map unit occurs more widely in the southern part of the island, with about 22 small- and medium-sized delineations, than in the northern part of the island, with 11 small-sized delineations. Ten delineations with the sombric variant (FBa) and four delineations with shallow Fairbridge soils over bedrock (FB1) occur in the southern part of the island. This map unit occupies an area of 213 ha (1.1% of total map area).

GALIANO SOIL AND MAP UNITS

Galiano soil (GA)

Galiano soils are well to moderately well drained shaly loam to shaly silt loam soils that have developed on shallow colluvial, residual, and glacial drift materials of weathered shale or siltstone over shale or siltstone bedrock within 100 cm. These soils usually have a layer of fractured bedrock (paralithic) between the solum and the unweathered consolidated bedrock. Coarse fragment content is between 20 and 50%, often exceeding 50% with depth. The profile description and analyses of a selected Galiano soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil : AH 0-10 cm (if absent, Bm horizon)
Texture, surface soil (0-30 cm) : L-Sil
Texture, subsurface soil : L-Sil (CL)
Depth of solum (A and B horizons) : 40 cm (20-70 cm)
Depth of soil (A, B, and C horizons) : 50 cm (20-100 cm), controlled by bedrock
Depth to fractured bedrock : 50 cm (20-100 cm)
Depth and type of restricing layer : 60 cm (20-100 cm), consolidated bedrock
Effective rooting depth : 45 cm (20-80 cm)
CF content and type (0-30 cm) : 20-50%, shaly
CF content and type, subsurface : 40-80%, shaly and flaggy
Perviousness : Moderate
Percolation : Moderate
Soil classification : Orthic Dystric Brunisol

Water regime

Galiano soils are well to moderately well drained soils. Faint mottling may occur in the subsoil. They are wet during the winter months but are usually droughty during the summer months. Water tables do not remain within 100 cm from the surface for any prolonged period of time. During and shortly after wet periods, water may flow laterally through a saturated subsoil on top of sloping bedrock.

Variability

The most variable characteristic of the Galiano soils is the depth to bedrock. When bedrock occurs within 50 cm of the surface, the soils are mapped as a very shallow lithic phase (GAsl). If it cannot be reasonably determined at what depth the bedrock occurs within the 100 cm or if the depth to bedrock is highly variable, then these areas are mapped as GA. Occasionally, an eluviated (Ae) horizon may occur or some movement of fine clays may take place. The layer of fractured bedrock between the solum and the consolidated, unweathered bedrock is between 5 and 25 cm thick (average 10 cm). Roots and the downward movement of water are not necessarily restricted by this layer.

Similar soils

Galiano soils are often found together with the well drained, sandy loam to loamy sand textured Saturna soils that have developed on colluvial and glacial drift materials over sandstone bedrock within 100 cm. Both soils occur on similar slopes and in similar landscape positions. Often, Galiano and Saturna soils occur so closely together in the landscape because of the intermixing of bedrock types that they cannot be reasonably separated. Where this occurs, both soils are mapped as Haslam (HA).

Natural vegetation

The natural vegetation consists of coast Douglas fir, some scattered Pacific madrone, and occasionally some western red cedar. The ground cover includes short salal, grasses, and moss.

Land use

In only a few instances on Saltspring Island, Galiano soils have been cleared for pasture and hay crops, and for sheep grazing. Galiano soils are generally not suitable for agriculture because of steep topography, stoniness, shallow to bedrock, droughtiness, low fertility, and the frequency of bedrock outcrops. Despite these limitations, some property owners have been able to change Galiano soils into a productive vegetable garden. This could only be accomplished with high monetary inputs and labor intensive management. The best use for Galiano soils is for growing coniferous trees.

Map units

Galiano soil occurs as the dominant soil in two map units, in the Galiano (GA) simple map unit and in the Galiano - Mexicana (GA-ME) compound map unit.

Galiano map unit (GA)

The Galiano map unit consists dominantly (75-100%) of the well to moderately well drained Galiano soils with up to 25% inclusions of shale or siltstone bedrock exposures (Rock) or similar but coarser textured soils over sandstone bedrock (Saturna soils). The bedrock exposures are usually associated with the very shallow lithic Galiano soils (GAsl), and are a limiting factor for use interpretations of the GAsl delineations. The inclusions of Saturna soil are not limiting the use interpretations of the GA map unit and are almost always associated with the GA delineations.

Landform and occurrence

This map unit occurs in areas with shallow soils over sedimentary bedrock on elongated parallel ridges and knolls having a wide variety of slopes ranging in steepness from 10% to 70%, or more. The GAsl delineations are generally found in rocky areas with strong to steep slopes (31% to 70%, or more), whereas the GA delinations are more restricted to moderately and strongly sloping (10-30%) landscape positions. Inclusions of Rock and Saturna soils occur as small areas at random. This map unit occurs at all elevations.

Distribution and extent

Most of the 28 GA and GAsl delineations were mapped on the north sheet. GAsl delineations occur slightly more frequently than the GA delineations. They both occur as medium- to large-sized, often narrow, elongated delineations. The Galiano map unit (GA and GAsl) occupies an area of 412 ha (2.2% of total map area).

Galiano - Mexicana map unit (GA-ME)

This map unit consists dominantly (50-75%) of the well to moderately well drained Galiano soil with a subdominant proportion (25-50%) of moderately well drained gravelly sandy loam to gravelly loam textured soils developed on morainal deposits (15-25% coarse fragments) overlying compact, unweathered till within 100 cm (Mexicana soil). The Mexicana soil does not limit the use interpretations for the GA-ME map unit, in fact it somewhat enhances the interpretations.

Landform and occurrence

This map unit occurs in areas with shallow soils over sedimentary bedrock on elongated parallel ridges and knolls with strong to extreme sloping (16-70%) topography. Mexicana soils occupy bench-like and side slope landscape positions and isolated pockets where till deposits have been left undisturbed, and frequently occur in areas too small to map separately but collectively they comprise a significant (25-50%) proportion of the map unit.

Distribution and extent

The Galiano - Mexicana map unit is a minor one, occurring as six medium-sized long and narrow delineations that are controlled by the underlying bedrock and the ancient movement of glacial ice. They have only been mapped in the Mount Erskine and Mount Belcher upland area. This map unit occupies an area of 158 ha (0.9% of total map area).

HASLAM SOIL COMPLEX AND MAP UNITS

Haslam soil (HA)

The Haslam soil complex consists of well drained soils ranging in texture from channery and shaly sandy loam to channery and shaly silt loam colluvial, residual, and glacial drift materials over sandstone, siltstone, or shale bedrock within 100 cm. The soil materials usually have a layer of fractured bedrock (paralithic) between the solum and the unweathered solid bedrock. Coarse fragment content is between 20 and 50%, often exceeding 50% in the subsoil. The different bedrock types occur either sequentially or intermixed. Consequently, Haslam is a complex of Galiano and Saturna soils.

Ranges in soil characteristics

Thickness of surface soil	: Ah 0-10 cm (if absent, Bm horizon)
Texture, surface soil (0-30 cm)	: SL-SiL
Texture, subsurface soil	: SL-SiL (LS)
Depth of solum (A and B horizons)	: 60 cm (20-75 cm)
Depth of soil (A, B, and C horizons)	: 65 cm (25-95 cm)
Depth to fractured bedrock	: 65 cm (20-100 cm)
Depth and type of restricting layer	: 75 cm (20-100 cm), consolidated bedrock
Effective rooting depth	: 60 cm (20-90 cm)
CF content and type (0-30 cm)	: 20-50%, shaly and channery
CF content and type, subsurface	: 40-70%, shaly, channery, and flaggy
Perviousness	: Rapid to moderate
Percolation	: Moderate
Soil classification	: Orthic Dystric Brunisol

Water regime

Haslam soil complex consists of well drained soils. They are moist and occasionally wet during the winter months but droughty during the summer. Water tables do not remain within 100 cm for any prolonged period of time. During and shortly after wet periods, water may flow laterally through the saturated subsoil on top of sloping bedrock. The fractured bedrock materials on top of the unweathered, consolidated bedrock does not impede the movement of water.

Variability

The most variable characteristics of the Haslam soil complex is the depth to bedrock. When bedrock occurs within 50 cm of the surface, the Haslam soil complex is mapped as a very shallow lithic phase (HAsl). If it cannot be reasonably determined at what depth the bedrock occurs within the 100 cm range or if the depth to bedrock is highly variable, then these areas are mapped as HA. The soil textures are also variable for the Haslam soil complex, depending on the type of bedrock. When the soil has developed on sandstone materials, textures are generally sandy loam, occasionally loam sandy. If developed on shale materials, textures are generally loam, occasionally clay loam. Soil developed on siltstone materials are generally of silt loam texture. The layer of fractured bedrock between the solum and the unweathered consolidated bedrock is between 5 and 25 cm thick (average 10 cm). Roots and the downward movement of water are not necessarily restricted by this layer.

Similar soils

Haslam is a complex of Galiano and Saturna soils where their respective bedrock types are so intimately intermixed that it is impractical to map them repeatedly.

Natural vegetation

The natural vegetation on the Haslam soil complex consists of coast Douglas fir, and Pacific madrone, and occasionally of western red cedar, western hemlock, and grand fir. The ground cover consists of short salal, western bracken, Oregon grape, and grasses.

Land use

The Haslam soil complex is rarely used for agriculture because of many limiting factors such as steep topography, stoniness, shallow to bedrock, droughtiness, low fertility, and the frequency of rock outcrops. Despite these limitations, some property owners have been able to change the Haslam complex into a productive vegetable garden. This could only be accomplished with high monetary inputs and labor intensive management. The best use for Haslam soils is for growing coniferous trees.

Map units

Being one of the most extensively and frequently mapped soils on Saltspring Island, the Haslam soil complex occurs in many map units. It is dominant in the simple Haslam (HA) map unit and in the compound Haslam - Brigantine (HA-BE) map unit, the Haslam - Cowichan (HA-CO) map unit, and the Haslam - Qualicum (HA-QU) map unit. Haslam is subdominant in the compound map units of Rock - Haslam (RO-HA) and of St. Mary - Haslam (SM-HA), which are described under Rock and St. Mary, respectively.

Haslam map unit (HA)

The Haslam map unit consists dominantly (75-100%) of the well drained Haslam complex with up to 25% of bedrock exposures (Rock) or of moderately well drained soils developed on gravelly sandy loam to loam textured morainal deposits overlying compact till within 100 cm (Mexicana soils). The inclusions of bedrock exposures are almost always associated with the very shallow lithic Haslam soils (HAsl), and are a limiting factor in use interpretations for the HAsl delineations. The inclusions of Mexicana soils, almost always associated with the Haslam (HA) delineations, do not limit the use interpretations of the HA map unit.

Landform and occurrence

The Haslam map unit occurs in areas with shallow soils over sedimentary bedrock on elongated parallel ridges and knolls having a wide variety of slopes ranging in steepness from 10% to 70%, or more. The different types of bedrock (sandstone, shale, and siltstone) occur either sequentially or intermixed. GAsl delineations are generally found in rocky areas on the steeper sloping landscape positions (31-70%) on ridged topography. HA delineations occur on moderately to strongly sloping bench-like landscape positions (10-30% slopes), with Mexicana soils on side slope positions and in isolated pockets where till deposits have been left undisturbed. The Haslam map unit seldom occurs at elevations exceeding 100 m.

Distribution and extent

The Haslam map unit (HA and HAsl) is one of the most extensively and frequently occurring map units on Saltspring Island, in particular in the northern part (80 delineations). Only two delineations were mapped on the southern part. The HA delineations occur more frequently than do the HAsl ones. Delineations are mostly long and narrow and are of a medium to large size. The Haslam map unit (HA and HAsl) occupies an area of 1408 ha (7.6% of total map area).

Haslam - Brigantine map unit (HA-BE)

The Haslam - Brigantine map unit consists dominantly (50-75%) of the well drained Haslam soil complex with a subdominant proportion (25-50%) of imperfectly drained soils with a capping of loamy sand to sandy loam texture (30-100 cm) over deep (>100 cm), silty clay loam to silty clay marine deposits that are usually stone free (Brigantine soils). This map unit may occasionally include minor amounts of similar but poorly drained soils (Parksville). The Brigantine soils are the least limiting soils in the HA-BE map unit. Consequently, they favorably influence the use interpretations for this map unit.

Landform and occurrence

This map unit occurs in landscapes that are characterized by a series of elongated narrow ridges (slopes 16-70%) with shallow soils over sandstone, siltstone, and shale bedrock (Haslam) alternated by long, narrow depressions and draws, occupied by Brigantine soils (slopes 2-15%) in between the ridges. These two soils occur sequentially in such a way that they could not be reasonably mapped into two individual map units. This map unit usually occurs at elevations between 0 and 100 m.

Distribution and extent

All 15 delineations of the HA-BE map unit were mapped in the northeasterly part of Saltspring. Most of these were medium-sized delineations. This map unit occupies an area of 225 ha (1.2% of total map area).

Haslam - Cowichan map unit (HA-CO)

The Haslam - Cowichan map unit consists dominantly (50-75%) of the well drained Haslam soil complex with a subdominant proportion (25-50%) of poorly drained soils developed on deep (>100 cm), silty clay loam to silty clay marine deposits that are usually stone free (Cowichan soils). This map unit may occasionally include minor amounts of similar poorly drained soils with more variable texture (Tolmie). The poorly drained soils do not limit the use interpretations for this map unit significantly.

Landform and occurrence

This map unit occurs in landscapes that are characterized by a series of elongated, narrow ridges (slopes 16-70%) with shallow soils over sandstone, siltstone, and shale bedrock (Haslam) alternated by long, narrow depressions and draws, occupied by Cowichan soils (slopes 2-9%) in between the ridges. These two soils occur sequentially in such a way that they could not be reasonably mapped into two individual map units. This map unit usually occurs at elevations between 0 and 100 m.

Distribution and extent

This is a minor map unit on Saltspring Island, with 11 medium-sized delinations mapped in the northern part only. It occupies an area of 123 ha (0.7% of total map area).

Haslam - Qualicum map unit (HA-QU)

The Haslam - Qualicum map unit consists dominantly (50-75%) of the well drained Haslam soil complex with a subdominant proportion (25-50%) of rapidly to well drained, deep (>150 cm), gravelly sandy loam to gravelly sandy soils developed on glaciofluvial, fluvial, or marine deposits with 20-50% gravels (Qualicum soils). The Qualicum soils do not limit the use interpretations of this map unit.

Landform and occurrence

This map unit occurs in landscape positions that are characterized by ridges and knolls with shallow soils over sandstone, siltstone, and shale bedrock (Haslam) on gently to strongly sloping (6-30%), subdued topography. The Qualicum soils occur on the side slope positions as deep beach gravels, terraces, or outwash deposits, often associated with major drainageways. The Qualicum soils occur frequently as relative minor areas within the Haslam landscape in such a way that they could not be reasonably mapped separately from the Haslam soil into two individual map units.

Distribution and extent

The HA-QU is a minor map unit on Saltspring Island with 11 medium sized delineations mapped in the northern part only. It occupies an area of 135 ha (0.7% of total map area on Saltspring Island).

METCHOSIN SOIL AND MAP UNITS

Metchosin soil (MT)

Metchosin soils are very poorly drained organic soils that have developed on deep (>160 cm) deposits of black, humic, well-decomposed peat materials, composed mainly of sedge and woody plant remains. The soil is stone free. The profile description and analyses of a selected Metchosin soil are in the Appendix.

Ranges in soil characteristics

Organic material, surface tier (0-40 cm) : Moderately decomposed to almost completely decomposed mesic to humic peat materials (Om-Oh)

Organic material, middle tier (40-120 cm): Strongly to almost completely decomposed humic peat materials (Oh)

Organic material, bottom tier (120-160 cm): Dominantly strongly to almost completely decomposed humic peat materials (Oh)

Depth of soil : >160 cm

Depth to bedrock : >160 cm
Depth and type of restricting layer : Absent
Effective rooting depth : 0-30 cm
CF content and type (0-30 cm) : 0%
CF content and type, subsurface : 0%
Perviousness : Moderate
Percolation : Moderate
Soil classification : Typic Humisol

Water regime

Metchosin soils are very poorly drained soils. They are the wettest soils found on Saltspring Island. The water table remains at or close to the surface for most of the year. It may drop to below 50 cm from the surface during late summer (August and September). Because of its landscape position, Metchosin soils receive large amounts of runoff and seepage water from the surrounding landscape.

Variability

The most variable characteristic is the depth of the organic soil to the mineral substratum. When this occurs between 40 and 160 cm, the soils are mapped as shallow Metchosin soils (MTso). This changes the classification into a Terric Humisol. Also, when limno layers of at least 5 cm thick are found below the surface tier, the classification changes into a Limno Humisol. When this limno layer consists of coprogenous earth (sedimentary peat), soils are mapped as MTsp. When the limno layer consists of diatomaceous earth, soils are mapped as MTde. Occasionally, mesic, fibric, or cumulo layers are found in the surface or middle tiers but never thick enough to change the classification or significantly affect the use intepretations. The mineral subsoil, when present, is usually silty clay loam or silty clay. The depth of some of these organic deposits exceeds 4.5 m.

Similar soils

Metchosin soils are the only organic soils recognized on Saltspring Island. They occur together with the poorly drained fine textured Cowichan and Tolmie soils in similar landscape positions.

Natural vegetation

The natural vegetation consists of sedges, grasses, rushes, scattered willow, and hardhack.

Land use

The only limited agricultural use of Metchosin soils on Saltspring island is for the production of hay. Most of these soils are left undisturbed. When adequately drained, they can provide one of the best soils for vegetable production. The production of berry crops (blueberries and cranberries) is also reasonable on these soils. Metchosin soils are very strongly acid (pH 4.5-5.0) to strongly acid (pH 5.0-5.5) and need applications of lime, phosphorus, and potassium fertilizers for crop production.

Map units

The Metchosin soil only occurs as the dominant soil in the Metchosin (MT) map unit, which includes the following soil phases: MTso, Mtsp, and MTde.

Metchosin map unit (MT)

The Metchosin (MT) map unit consists purely (100%) of the deep (|160 cm) Metchosin soil. The Metchosin shallow organic phase (MTso) consists of Metchosin soils that have a mineral (terric) contact of at least 30 cm thick between 40 and 160 cm. The MTsp variant has a sedimentary peat (coprogenous earth) layer or layers of at least 5 cm thick in the middle or bottom tiers, whereas the MTde variant has a diatomaceous earth layer or layers of at least 5 cm thick in the middle or bottom tiers.

Landform and occurrence

The Metchosin map unit occurs in level to slightly depressional basins with slopes varying from 0 to 1%. In the upland areas it occurs as many small, wet areas in between bedrock ridges. This map unit occurs at all elevations.

Distribution and extent

Except for a few medium- to large-sized delineations, the Metchosin map unit occurs as many small and very small delineations, much more frequently in the southern part of the island than in the northern part. About half of the 105 Metchosin delineations were mapped as MTso. Only a few delineations were recognized as MTsp and MTde. Collectively, they occupy an area of 167 ha (0.9% of total map area).

MEXICANA SOIL AND MAP UNITS

Mexicana soil (ME)

Mexicana soils are moderately well drained soils that have developed on gravelly sandy loam to gravelly loam morainal deposits overlying deep, compact, unweathered till within 100 cm from the surface. Coarse fragment content is generally between 15 and 25%. The unweathered till materials have generally less than 20% clay content and usually occur at 80 cm depth. These are the only till materials recognized on Saltspring Island. The profile description and analyses of a selected Mexicana soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah 0-10 cm (Ap 10-15 cm)
Texture, surface soil (0-30 cm)	: SL-L
Texture, subsurface soil	: SL-L
Depth of solum (A and B horizons)	: 65 cm (40-90 cm)
Depth of soil (A, B, and C horizons)	: 80 cm (40-100 cm)
Depth to bedrock	: > 100 cm
Depth and type of restricting layer	: 80 cm (40-100 cm); compact, unweathered till
Effective rooting depth	: 80 cm (40-100 cm)
CF content and type (0-30 cm)	: 15-25%, gravelly
CF content and type, subsurface	: 15-25%, gravelly
Perviousness	: Moderate to slow
Percolation	: Moderate in B horizon, slow in C horizon (1.3-11.8 min/cm)
Soil classification	: Orthic Dystric Brunisol

Water regime

The Mexicana soils are generally moderately well drained soils with faint mottling throughout the solum, often increasing to distinct mottles below 50 cm from the surface. The Mexicana soils are wet during the winter months but are dry and droughty during the summer. Perched water table conditions often occur on top of the compact till. Seepage water is common. Water moves laterally over the compact till during the winter or after heavy rainfall. Imperfectly drained Mexicana soils occur occasionally. The till, when dry, is impervious to water and root growth. During the wetter part of the year, the top 10-15 cm of the unweathered till becomes somewhat pervious.

Variability

The Mexicana soils can be variable in one or more properties. The most variable characteristic is the depth to compact, unweathered till, which occurs at an average depth of 80 cm from the surface, with a range of 40-100 cm. When the unaltered parent materials (unweathered compact till) are not found within 100 cm, the transitional BC horizon, which usually has a massive structure, is taken as the depth to a restricting layer. The drainage may also vary in the Mexicana soils. Delineations with dominantly imperfectly drained Mexicana soils are mapped as MEid. Mexicana soils with Ah or Ap horizons deeper than 10 cm are mapped as MEa. A few delineations have Mexicana soils with a podzolic Bf horizon, which are mapped as MEt. Weakly cemented and occasionally moderately cemented horizons may be present as thin, discontinuous bands. MEmc indicates a Mexicana soil with a moderately cemented horizon.

Similar soils

Mexicana soils are similar to the moderately well drained Trincomali soils that have a gravelly sandy loam and gravelly loamy sand textured overlay of between 30 and 100 cm thick over similar textured compact till. The unweathered compact till of the Mexicana soil is also found in the subsoil of the Suffolk and St. Mary soils.

Natural vegetation

The natural vegetation of the Mexicana soils consists of coast Douglas fir, western red cedar, and grand fir, with an understory of salal, western sword fern, huckleberry, and Oregon grape.

Land use

Very little agricultural development has taken place on the Mexicana soils. Clearings are small, scattered, and used only for hay and pasture. The major limitations for agricultural use are the droughtiness, topography, and stoniness. Mexicana soils on slopes not exceeding 15% could be improved with irrigation and stone picking to grow a small range of annual crops. Tree fruits and berries seem to do well on these soils under irrigation. Mexicana soils are also good for growing coniferous trees.

Map units

As major soils on Saltspring Island, Mexicana soils occur in eight different map units. They are the dominant soils in the Mexicana (ME) simple map unit and in the Mexicana - Trincomali (ME-TR) compound map unit. In addition, Mexicana soils occur as subdominant components in six other map units: the Galiano - Mexicana (GA-ME), the Musgrave - Mexicana (MG-ME), the Rumsley - Mexicana (RY-ME), the Salalakim - Mexicana (SL-ME), the St. Mary - Mexicana (SM-ME), and the Saturna - Mexicana (ST-ME) map units. These map units are described elsewhere in Part 4 under the dominant soil for the map unit.

Mexicana map unit (ME)

The Mexicana map unit consists dominantly (65-100%) of the moderately well drained Mexicana soils with up to 20% of similar soils with a shallow gravelly sandy loam or gravelly loamy sand marine or fluvial capping from 0 to 30 cm thick with 20-50% coarse fragments. This coarser textured capping does not limit the use interpretations of the ME map unit.

Landform and occurrence

The Mexicana map unit occurs throughout the map area on gently to strongly sloping (6-30%) subdued topography and on very strong slopes (31-45%) in upland areas. The till soils occupy many different landscape positions such as depressions and hollows on side slopes where till deposits have been protected from subsequent erosional processes after the last glaciation. This map unit occurs at all elevations.

Distribution and extent

The Mexicana map unit occurs extensively and frequently as a major map unit throughout Saltspring Island with 60 delineations. Many large-sized delineations were mapped in the Ganges to St. Mary Lake area and in the upland areas in the southern part. Only a few delineations were mapped as MEid and MEt. Collectively, they occupy an area of 1549 ha (8.4% of total map area).

Mexicana - Trincomali map unit (ME-TR)

The Mexicana - Trincomali map unit consists dominantly (50-65%) of the moderately well drained Mexicana soils with subdominant proportions (35-50%) of a moderately well drained soil developed on 30-100 cm of gravelly sandy loam to gravelly loamy sand materials overlying compact till within 100 cm (Trincomali soil). This map unit may also contain minor inclusions of similar but rapidly to well drained and deeper (>150 cm) soils (Qualicum soil). The Trincomali and Qualicum soils can adversely influence the use interpretations for this map unit.

Landform and occurrence

The Mexicana - Trincomali map unit occurs throughout the map area on moderately to very strongly sloping (10-45%) topography and in similar landscape positions as the Mexicana map unit. Trincomali soils occur on side slope positions as shallow beach gravels, terraces, or outwash deposits usually at or near the shoreline or along drainageways. Minor areas of Qualicum soils occur at random where sand and gravel deposits are deeper than 150 cm.

Distribution and extent

This map unit occurs throughout Saltspring Island as 20 medium- and large-sized delineations, more frequently in the southern part. It has been mapped less frequently than the ME map unit. ME-TR map unit occupies an area of 344 ha (1.9% of the total map area).

MUSGRAVE SOIL AND MAP UNITS

Musgrave soil (MG)

Musgrave soils are well drained upland soils that have developed on shallow deposits of gravelly sandy loam to gravelly loamy sand textured colluvial and glacial drift materials over dominantly metamorphosed sedimentary bedrock within 100 cm. Coarse fragment content is between 20 and 50%. The profile description and analyses of a selected Musgrave soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah 0-10 cm
Texture, surface soil (0-30 cm)	: SL-LS
Texture, subsurface soil	: SL-LS
Depth of solum (A and B horizons)	: 55 cm (20-100 cm)
Depth of soil (A, B, and C horizons)	: 80 cm (30-100 cm)
Depth to bedrock	: 80 (30-100 cm)
Depth and type of restricting layer	: 80 cm (30-100 cm), bedrock

Effective rooting depth : 80 cm (30-100 cm)
CF content and type (0-30 cm) : 20-50%, angular gravelly and gravelly
CF content and type, subsurface : 20-50%, angular gravelly and gravelly
Perviousness : Rapid
Percolation : Rapid
Soil classification : Orthic Dystric Brunisol

Water regime

Musgrave soils are well drained soils without evidence of mottling within 100 cm of the surface. The soils are moist throughout the winter months but quickly become droughty in dry periods during the summer.

Variability

The most variable characteristic of the Musgrave soil is the depth to bedrock. Based on 32 profile observations, the average depth to bedrock is 79 cm with a range of 30-150 cm. From these observations, 25% have soils deeper than 100 cm. These deeper Musgrave soils do not occur consistently enough to be mapped separately as a deep phase. Therefore, they are included in the MG map unit. Delineations with predominantly very shallow lithic (< 50 cm) Musgrave soils are mapped as MGsl. These delineations have also the higher percentage of bedrock inclusions (within the 0-25% range). Some Musgrave soils have pronounced podzolic Bf horizons, which changes the soil classification into Orthic Humo-Ferric Podzols. These are indicated by MGt. The soil texture (gravelly sandy loam) is very uniform for these soils. Occasionally, gravelly loamy sandy horizons are found. Coarse fragment content may exceed 50% in the parent materials (C horizon).

Similar soils

The Musgrave soils resemble other well drained, shallow upland soils that have developed on similar textured colluvium and glacial drift materials but overlying coarse grained metamorphosed igneous bedrock (Rumsley). The main difference is in the rock type, but the morphology and soil characteristics are much the same.

Natural vegetation

The natural vegetation consists of coast Douglas fir, scattered Pacific madrone, some grand fir, and western hemlock with an understory of short salal, western bracken, Oregon grape, and grasses.

Land use

The Musgrave soils are best left in their original vegetation. The soils are often too shallow, too steep, too stony, and too droughty for agricultural development. Occasionally, sheep roam on these soils where the vegetation consists dominantly of grasses. Sometimes the bedrock of the Musgrave soils is quarried. The location of the only known quarry on the road to Musgrave Landing is indicated by an on-site symbol (see map).

Map units

The Musgrave soils are dominant in two map units---the Musgrave (MG) simple map unit and the Musgrave - Mexicana (MG-ME) compound map unit. They also occur as subdominant soils in the Rock - Musgrave (RO-MG) map unit, which is described under Rock (RO).

Musgrave map unit (MG)

The Musgrave map unit consists dominantly (75-100%) of the well drained Musgrave soils with up to 25% of metamorphosed sedimentary bedrock exposures (Rock). The bedrock exposures are more associated with the very shallow lithic Musgrave soils (MGsl), and are more limiting than the Musgrave soils for use interpretations of the map unit.

Landform and occurrence

The Musgrave map unit occurs in areas with shallow soils over metamorphosed sedimentary bedrock on moderately to steeply sloping (10% to 70%, or more), hummocky and ridged terrain of the Mt. Tuam and Mt. Sulivan upland areas. Bedrock exposures occur at random, most frequently in association with the very shallow lithic Musgrave soil (MGsl).

Distribution and extent

Musgrave is a major map unit with approximately 23 medium- and large-sized delineations. There are about as many MG as MGsl delineations. These were dominantly mapped in the Mt.

Tuam and Mt. Sulivan upland regions of Saltspring Island. In addition, a few delineations were mapped in the Mount Maxwell and Beaver Point areas. The Musgrave map unit occupies an area of 394 ha (2.1% of total map area).

Musgrave - Mexicana map unit (MG-ME)

This map unit consists dominantly (50-75%) of the well drained Musgrave soil with a subdominant proportion (25-50%) of moderately well drained soils developed on gravelly sandy loam to gravelly loam textured morainal deposits over compact, unweathered till within 100 cm (Mexicana soil). The Mexicana soil does not significantly limit the use interpretations of the Musgrave - Mexicana map unit.

Landform and occurrence

The soil landscape consists of hummocky and ridged terrain with moderately to steeply sloping (10% to 70%, or more) topography in the Mt. Tuam and Mt. Sulivan upland areas. Mexicana soils occupy side slope positions and isolated pockets where till deposits have been protected, occurring frequently in areas too small to map separately but collectively comprising a significant (25-50%) proportion of the map unit.

Distribution and extent

The Musgrave - Mexicana map unit is the most extensive one on Saltspring Island. It occurs as 21 very large-sized delineations in the Mt. Tuam and Mt. Sulivan upland areas. This map unit occupies an area of 2109 ha (11.4% of total map area).

NEPTUNE SOIL AND MAP UNITS

Neptune soil (NT)

Neptune soils are well drained, black calcareous soils consisting of shallow gravelly loamy sand to gravelly sand marine deposits mixed with clam and oyster shells, organic debris, and sometimes human artifacts (Indian middens) over sandy marine deposits or bedrock between 70 and 120 cm. Coarse fragment content is between 15 and 35%. Soils have no profile development.

Ranges in soil characteristics

Thickness of surface soil : Ah 75 cm (40-120 cm)
Texture, surface soil (0-30 cm) : LS-SL
Texture, subsurface soil : LS-S
Depth of solum (A horizon) : 75 cm (40-120 cm)
Depth of soil (A and C horizons) : 90 cm (70-120 cm)
Depth to bedrock : 90 cm (70-120 cm), if present
Depth and type of restricting layer : 90 cm (70-120 cm), bedrock or different textured materials
Effective rooting depth : 0-20 cm
CF content and type (0-30 cm) : 15-35%, gravelly and angular gravelly
CF content and type, subsurface : 20-50%, gravelly
Perviousness : Rapid
Percolation : Rapid
Soil classification : Orthic Humic Regosol

Water regime

Neptune soils are moist during the winter months but very droughty during the summer months. There are no discernible mottles within 120 cm from the surface.

Variability

Although the texture of the Neptune soils are very uniform, the coarse fragment content and quantity of shells may vary considerably. Between 70 and 120 cm depth, the Neptune soils may overlie coarse textured marine materials or bedrock. The high calcium carbonate content from the shells prevents any significant profile development, as indicated by the absence of a B horizon.

Similar soils

Because of its uniqueness, Neptune soils are not related to any other soils.

Natural vegetation

The natural vegetation consists of grasses and scattered coast Douglas fir.

Land use

Neptune soils are of more interest archaeologically than agriculturally. On Saltspring Island, these soils are sometimes used for gardening. They are calcareous soils, very high in organic matter and nitrogen content. A major limitation is droughtiness and stoniness.

Map units

The Neptune soil only occurs as the dominant soil in the Neptune (NT) map unit.

Neptune map unit (NT)

The Neptune map unit consists purely (100%) of the Neptune soil.

Landform and occurrence

The Neptune map unit occurs as narrow, discontinuous deposits along the seashore on nearly level to very gently sloping (0.5-5%) topography.

Distribution and extent

The Neptune map unit is a very minor one, occurring as three small and narrow delineations. It occupies an area of 6 ha (0.03% of total map area). Many more but smaller unmappable areas with Neptune soils were indicated with the on-site symbol Ⓝ.

PARKSVILLE SOIL AND MAP UNITS

Parksville soil (PA)

Parksville soils are poorly drained soils that have between 30 and 100 cm of a loamy sand to sandy loam overlay by marine or fluvial origin over deep (|100 cm), silty clay loam to silty clay textured marine deposits that are usually stone free. The profile description and analyses of a selected Parksville soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil : Ah 15 cm (10-25 cm)
Texture, surface soil (0-30 cm) : SL (LS)
Texture, subsurface soil : LS-SL, deeper SiCL-SiC
Thickness of overlay materials : 70 cm (30-90 cm)
Depth of solum (A and B horizons) : 70 cm (30-90 cm)
Depth of soil (A, B, and C horizons): |100 cm
Depth to bedrock : |100 cm

Depth and type of restricting layer : 70 cm (30-90 cm), fine textured, often massive structured subsoil
Effective rooting depth : 70 cm
CF content and type (0-30 cm) : 0-10%, gravelly and angular gravelly
CF content and type, subsurface : 0-5%, gravelly
Perviousness : Moderate to slow
Percolation : Rapid in surface 70 cm, very slow below 70 cm
Soil classification : Orthic Humic Gleysol

Water regime

Parksville soils are poorly drained soils with distinct to prominent mottles within 50 cm from the surface. They are saturated with water to within 30 cm from the surface from late fall to spring. During the summer, the water table drops to below 60 cm, allowing the surface horizons to become dry. Perched water tables occur on top of the fine textured, massive structured subsoil. Soil receives seepage and runoff water from surrounding areas, which keeps the subsoil in a moist condition during dry periods of time.

Variability

Some variations of the Parksville soil occur. A well-decomposed organic surface layer (Oh) may be present. Occasionally, the gravel content in the surface horizon is higher than 10%. Also, in a few instances, the overlay materials (LS-SL) are deeper than 100 cm. Most of these variations do not occur frequently or consistently enough to be mapped. However, one specific area north of St. Mary Lake has shallow Parksville soils over bedrock occurring between 50 and 100 cm from the surface. This area is mapped as PA1.

Similar soils

The imperfectly drained member of the Parksville soil is the Brigantine soil. Parksville soils differ from the poorly drained Tolmie soils in having coarse textured overlay materials thicker than 30 cm. Also, Tolmie soils are usually saturated with water for a longer period during the year.

Natural vegetation

The natural vegetation on Parksville soils consists of western red cedar, red alder, hardhack, and some willow, with an understory of western swordfern, common horsetail, and vanilla leaf. Skunk cabbage often occurs in the wettest portions that have an organic surface layer (Oh).

Land use

Most of the Parksville soils on Saltspring Island have been left in their original vegetation. However, some Parksville soils have been used for pasture and hay crops. The major limitation for growing a wider range of crops is the wetness into the late spring caused by high groundwater tables. This could be overcome with artificial drainage. The soils are strongly acid (pH 5.1-5.5) at the surface and moderately acid (pH 5.6-6.0) in the subsurface. Because Parksville soils occur in small pockets, very little is cultivated for commerical agriculture.

Map units

Two map units occur on Saltspring Island in which Parksville soils are the dominant soils---the simple map unit Parksville (PA) and the compound map unit Parksville - Tolmie (PA-TL). In addition, Parksville is a minor soil in the Brigantine (BE) map unit and in the Haslam - Brigantine (HA-BE) map unit, both of which are discussed under BE and HA-BE map unit descriptions.

Parksville map unit (PA)

The Parksville map unit consists dominantly (65-100%) of the poorly drained Parksville soils. The map unit also includes 0-35% of imperfectly drained soils developed on the same parent material sequence (Brigantine). These Brigantine soils are not limiting the use interpretations for the map unit.

Landform and occurrence

The Parksville map unit occurs on nearly level to very gently sloping (0.5-5%) topography in depressional areas, swales, and drainageways. Parksville and Brigantine soils usually occur together around the periphery of marine basins where sandy materials have been deposited on top of fine textured marine materials. Brigantine soils are found on the better drained landscape positions. Brigantine soils occur as unmappable minor inclusions in the Parksville map unit. This map unit is also found in depressional areas in between bedrock ridges. Occasionally, the Parksville (PA) map unit occurs on gentle seepage slopes (6-9%). Elevation is usually between 0 and 100 m.

Distribution and extent

This map unit occurs as 33 small-sized and often narrow-shaped delineations, much more frequently throughout the northern part of Saltspring Island. It occupies an area of 108 ha (0.6% of total map area).

Parksville - Tolmie map unit (PA-TL)

The Parksville - Tolmie map unit consists dominantly (50-75%) of the poorly drained Parksville soils with a subdominant proportion (25-50%) of poorly drained soils developed on deep (>100 cm) silt loam to silty clay loam marine deposits that are usually stone free (usually Tolmie soils, occasionally Cowichan soils). The Tolmie and Cowichan soils do not adversely affect the use interpretations for the PA-TL map unit.

Landform and occurrence

The Parksville - Tolmie (PA-TL) map unit occurs on nearly level to very gently sloping (0.5-5%) topography in depressional areas, swales, and drainageways at elevations between 0 and 100 m. Tolmie (Cowichan) soils occupy the lowest landscape positions as significant portions of the map unit. However, they occur at random within the map unit; hence they cannot be mapped separately.

Distribution and extent

This map unit, which is a minor one for Saltspring Island, occurs only in the northern part as 11 small, often narrowly shaped delineations. It occupies an area of 79 ha (0.4% of total map area).

QUALICUM SOIL AND MAP UNITS

Qualicum soil (QU)

Qualicum soils are rapidly to well drained soils developed on deep (>150 cm) deposits of gravelly sandy loam to gravelly sand textured glaciofluvial, fluvial, or marine deposits. Coarse fragment content throughout the profile is between 20 and 50%. The profile description and analyses of a selected Qualicum soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil : Ah 0-10 cm (Ap 10-15 cm)
Texture, surface soil (0-30 cm) : LS-SL
Texture, subsurface soil : SL-S

Depth of solum (A and B horizons) : 60 cm (35-120 cm)
Depth of soil (A, B, and C horizons) : >150 cm
Depth to bedrock : >150 cm
Depth and type of restricting layer : Occasionally discontinuous cementation
Effective rooting depth : 60 cm (35-120 cm)
CF content and type, (0-30 cm) : 25% (15-35%); gravelly and cobbly
CF content and type, subsurface : 45% (30-70%); gravelly, cobbly, stony
Perviousness : Rapid
Percolation : Rapid
Soil classification : Orthic Dystric Brunisol

Water regime

Qualicum soils are rapidly to well drained soils. They are moist throughout the late fall to spring period but quickly become very droughty during the summer. The water table remains well below 100 cm throughout the year.

Variability

The coarse fragment content is one of the most variable characteristics of the Qualicum soils. When it exceeds 50% in the top 30 cm, the soils are indicated as a very gravelly phase (QUvg). When the coarse fragment content between 50 and 150 cm of depth is less than 20%, the soils are indicated as shallow (QUs). Shallow Qualicum soils over bedrock between 50 and 100 cm are mapped as a lithic phase (QUl). In some instances, Qualicum soils have been cultivated, resulting in an Ap horizon over 10 cm thick. These soils are indicated as QUa, the sombric variant. Occasionally, Qualicum soils have either discontinuous weakly cemented or moderately cemented horizons or they have podzolic Bf horizons. These variations are not consistent enough to be mapped.

Similar soils

Qualicum soils often occur together with similar drained and textured soils that have a much lower coarse fragment content (<20%), the Beddis soils. Qualicum soils also occur with similar textured but moderately well drained and shallow (<100 cm) soils overlying compact, unweathered till (Trincomali soils).

Natural vegetation

The natural vegetation on the Qualicum soils is coast Douglas fir, grand fir, and occasionally shore pine and scattered Pacific madrone. Shore pine is the dominant species after fires have occurred. The groundcover consists mainly of short salal and western bracken.

Land use

Small areas of Qualicum soils on Saltspring Island were once cultivated but are now used as pasture land. On one occasion an orchard was found on Qualicum soils. The major limitations that preclude more intensive agricultural development on these soils are the topography, droughtiness, and stoniness. Also, it is an infertile soil, low in nutrients and organic matter. With irrigation these soils could grow productive fruit trees. Qualicum soils are most extensively used as sources of sand and gravel for road building and construction purposes (for example, concrete). All abandoned and currently active gravel pits occur in areas with Qualicum soils. The location of these gravel pits are indicated as Ⓖ on the soil map.

Map units

Qualicum soils occur in different map units. They are the dominant soils in the Qualicum map unit. Qualicum soils are a subdominant component in the Haslam - Qualicum (HA-QU) map unit and they occur as minor soils in the Trincomali (TR) and Beddis (BD) map units. These last three map units are described under HA-QU, TR, and BD.

Qualicum map unit (QU)

The Qualicum map unit consists dominantly (75-100%) of the rapidly to well drained Qualicum soils and may include up to 25% of similar textured but moderately well drained soils that are shallow over compact, unweathered till within 100 cm (Trincomali soils). Trincomali soils are not limiting most use interpretations for the map unit.

Landform and occurrence

The Qualicum map unit occurs as deep outwash (deltaic) and terrace deposits associated with old drainageways and as beach deposits on gently to very strongly sloping (6-45%), occasionally on steeper sloping (46-70%) landscape positions. Trincomali soils occur at random in areas where till is close (within 100 cm) to the surface.

Distribution and extent

The Qualicum map unit is a major one on Saltspring Island with 55 medium-sized delineations. They occur more frequently throughout the northern part of the island. Eight delineations were mapped as QUa, four as QUvg, and two as QUs. This map unit occupies an area of 520 ha (2.8% of total map area).

ROCK AS NONSOIL AND MAP UNITS

Rock as nonsoil (RO)

Rock as nonsoil consists of undifferentiated consolidated bedrock exposed or covered by mineral soil less than 10 cm thick over consolidated bedrock. It is also called Rock Land or Rock Outcrop.

Natural vegetation

The natural vegetation consists of mosses, grasses, occasionally stone crop, with scattered dwarfing coast Douglas fir, and Pacific madrone.

Map units

Because many large areas on Saltspring Island consist of bedrock exposures with shallow soils over bedrock, bedrock exposures (RO) occur in many map units. Rock is the dominant (65-100%) component in the simple Rock (RO) map unit, Rock is also the dominant (50-65%) component in five compound map units, such as Rock - Haslam (RO-HA), Rock - Musgrave (RO-MG), Rock - Rumsley (RO-RY), Rock - Salalakim (RO-SL), and Rock - Saturna (RO-ST). Each of these map units are described here. In addition, bedrock exposures (RO) also occur as minor areas in the following seven map units: Bellhouse (BH), Galiano (GA), Haslam (HA), Musgrave (MG), Rumsley (RY), Salalakim (SL), and Saturna (ST). These map units are described elsewhere in this section.

Rock map unit (RO)

This map unit consists dominantly (65-100%) of undifferentiated bedrock exposed or covered by less than 10 cm of mineral soil with up to 35% of well drained soils developed on shallow, loamy sand to loam colluvial and glacial drift materials over bedrock, usually within 50 cm. The coarse fragment content of the soil materials is between 20 and 50%.

The kind of soil depends on the bedrock type on which it has developed. The inclusions of soil influence the use interpretations for this map unit favorably.

Landform and occurrence

The landscape represented by this map unit varies considerably in steepness and in surface expression. It includes areas with smooth unweathered sedimentary bedrock (slopes 16-45%), rock ridges and rocky knolls (slopes 10-70%), and rock bluffs, cliffs, and escarpments (slopes 71 to 100%, or more) of all rock types found on the island. Minor areas of soil occur in places where the bedrock has been fractured and weathered, often indicated by clumps of tree growth. It occurs at all elevations and aspects.

Distribution and extent

This is a frequently occurring map unit on Saltspring Island. It occurs as 62 medium-sized delineations throughout the island. This map unit includes many small islets off the seacoast. It occupies an area of 410 ha (2.2% of total map area).

Rock - Haslam map unit (RO-HA)

This map unit consists dominantly (50-65%) of sandstone, shale, and siltstone bedrock exposed or covered by less than 10 cm of mineral soil. The map unit also contains subdominant portions (35-50%) of well drained soils developed on shallow (10-50 cm), channery and shaly sandy loam to silt loam textured weathered colluvial, residual, and glacial drift materials over sandstone, siltstone, or shale bedrock (very shallow lithic Haslam, HAsl). Soils have a coarse fragment content of 20-50%. Haslam soils influence the use interpretations for this map unit favorably.

Landform and occurrence

This map unit occurs dominantly on rock ridges and rocky knolls (slopes 10-70%) and occasionally on steeper landscape positions (bluffs, cliffs, and escarpments) in the low and midland areas of Saltspring Island. Areas with Haslam soil (HAsl) occur on colluvial side slopes and at locations where bedrock has been fractured and weathered on top or in between the ridges and knolls. It occurs within 300 m elevation.

Distribution and extent

The Rock - Haslam map unit is a minor one. It has been mapped in the northern part of the island only as 10 small- and medium-sized delineations, and occupies an area of 37 ha (0.2% of total map area).

Rock-Musgrave map unit (RO-MG)

This map unit consists dominantly (50-65%) of metamorphosed sedimentary bedrock exposed or covered by less than 10 cm of mineral soil. The map unit also contains subdominant proportions (35-50%) of well drained soils developed on shallow (10-50 cm), gravelly sandy loam to gravelly loamy sand textured colluvial, and glacial drift materials over metamorphosed sedimentary bedrock (very shallow lithic Musgrave soil, MGsl). Soils have a coarse fragment content of 20-50%. Musgrave soils influence the use interpretations for this map unit favorably.

Landform and occurrence

This map unit occurs dominantly on rock ridges and knolls (slopes 16-70%) and occasionally on steeper landscape positions (bluffs and cliffs) in the midland and upland areas of southwestern Saltspring Island. Musgrave soils (MGsl) occur on colluvial side slopes and in areas where bedrock has been fractured and weathered on top or in between the ridges and knolls. It occurs at all elevations.

Distribution and extent

The Rock - Musgrave map unit is a major map unit, almost exclusively mapped as many large-sized delineations in the Mt. Tuam and Mt. Sulivan upland areas. It occupies an area of 1176 ha (6.3% of total map area).

Rock - Rumsley map unit (RO-RY)

This map unit consists dominantly (50-65%) of metamorphosed intrusive bedrock exposed or covered by less than 10 cm of mineral soil. The map unit also contains subdominant proportions (35-50%) of well drained soils developed on shallow (10-50 cm), gravelly sandy loam to gravelly loamy sand textured colluvial and glacial drift materials over metamorphosed intrusive bedrock (very shallow lithic Rumsley soil, RYsl). Soils have a coarse fragment content of 20-50%. Rumsley soils influence the use interpretations for this map unit favorably.

Landform and occurrence

This map unit occurs dominantly on rock ridges and rocky knolls (slopes 10-70%) and occasionally on steeper landscape positions (bluffs and cliffs) in the upland areas of southern Saltspring Island. Rumsley soils (RYsl) occur on colluvial side slopes and in areas where bedrock has been fractured and weathered on top or in between the ridges and knolls. It occurs at all elevations.

Distribution and extent

The Rock - Rumsley map unit is a major map unit. It was mapped as 36 medium- and large-sized delineations, concentrated in the upland areas of the south sheet. This map unit occupies an area of 683 ha (3.7% of the total map area).

Rock - Salalakim map unit (RO-SL)

This map unit consists dominantly (50-65%) of conglomerate bedrock exposed or covered by less than 10 cm of mineral soil. The map unit also contains subdominant proportions (35-50%) of rapidly to well drained soils developed on shallow (10-50 cm), gravelly sandy loam textured colluvial and glacial drift materials over conglomerate bedrock (very shallow lithic Salalakim soil, SLsl). Soils have 20-50% gravels. Salalakim soils influence the use interpretations for this map unit favorably.

Landform and occurrence

This map unit occurs on conglomerate rock ridges and rocky knolls with slopes between 16 and 70%. Salalakim soils (SLsl) occupy the colluvial side slopes and areas where bedrock has been fractured and weathered, often as pockets on top of or in between the knolls and ridges. It occurs at all elevations.

Distribution and extent

The Rock - Salalakim map unit is a minor map unit on Saltspring Island. It was mapped as four medium-sized delineations in the Mt. Erskine and Mt. Belcher upland areas. This map unit occupies an area of 102 ha (0.5% of total map area).

Rock - Saturna map unit (RO-ST)

This map unit consists dominantly (50-65%) of sandstone bedrock exposed or covered by less than 10 cm of mineral soil. This map unit also contains subdominant proportions (35-50%) of well drained soils developed on shallow (10-50 cm), channery sandy loam to channery loamy sand textured colluvial and glacial drift materials over sandstone bedrock (very shallow lithic Saturna soil, STsl). Soils have between 20 and 50% coarse fragments. Saturna soils influence the use interpretations favorably.

Landform and occurrence

This map unit occurs dominantly on rock ridges and knolls (slopes 10-70%) and in areas with smooth, unweathered sandstone (slopes 10-45%), or occasionally on steeper landscape positions (bluffs, cliffs, and escarpments). Saturna soils (STsl) occur on colluvial side slopes and in areas where bedrock has been fractured and weathered, often as pockets on top of or in between the ridges or knolls. It occurs at elevations between 0 and 300 m.

Distribution and extent

The Rock - Saturna unit has been mapped as 25 medium-sized, often long and narrow delineations throughout the southern part of Saltspring Island. This map unit occupies an area of 332 ha (1.8% of total map area).

RUMSLEY SOIL AND MAP UNITS

Rumsley soil (RY)

Rumsley soils are well drained soils that have developed on shallow deposits of gravelly sandy loam to gravelly loamy sand textured colluvium and glacial drift materials over coarse grained metamorphosed intrusive bedrock within 100 cm. Coarse fragment content is between 20 and 50%. The profile description and analyses of a selected Rumsley soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah 0-10 cm
Texture, surface soil (0-30 cm)	: SL-LS
Texture, subsurface soil	: SL-LS
Depth of solum (A and B horizons)	: 55 cm (25-90 cm)
Depth of soil (A, B, and C horizons)	: 60 cm 25-110 cm)

Depth to fractured bedrock : 60 cm (25-110 cm)
Depth and type of restricting layer : 70 cm (25-110 cm), consolidated, unweathered bedrock
Effective rooting depth : 60 cm (25-90 cm)
CF content and type (0-30 cm) : 15-35%, angular gravelly and gravelly
CF content and type, subsurface : 20-50%, angular gravelly and gravelly
Perviousness : Rapid
Percolation : Rapid
Soil classification : Orthic Dystric Brunisol

Water regime

The Rumsley soils are well drained with no evidence of mottling within 100 cm from the surface. The soil is moist throughout the winter months but quickly becomes droughty in dry periods during the summer. During and shortly after wet periods, water may flow laterally through the saturated subsoil on top of sloping bedrock.

Variability

The most variable characteristic of the Rumsley soil is the depth to bedrock. Based on information from 20 Rumsley profiles, the average depth to consolidated bedrock is 68 cm (25-110 cm). Areas where bedrock occurs within 50 cm from the surface are mapped as very shallow lithic Rumsley soil (RYsl). Otherwise, they are mapped as RY (bedrock within 100 cm). Most Rumsley soils have a layer 10 cm thick (5-25 cm) of fractured bedrock between the soil and the consolidated bedrock. Roots and the downward movement of water are not necessarily restricted by this layer. The coarse fragment content generally increases with depth. Occasionally, the coarse fragment content in the BC and C horizons exceeds 50%. A deeper (>10 cm) Ah horizon is occasionally present. Also a podzolic Bf horizon may be present, which changes the classification into an Orthic Humo-Ferric Podzol. These variations are too infrequent and too inconsistent to be mapped.

Similar soils

The Rumsley soil is similar to the Musgrave soil. The main difference is the rock type, but the morphology and soil characteristics are alike.

Natural vegetation

The natural vegetation consists of coast Douglas fir, scattered Pacific madrone, and occasionally grand fir, with an understory of salal, western bracken, and Oregon grape.

Land use

No known areas with Rumsley soil are used for agricultural purposes on Saltspring Island. Steep slopes, stoniness, rockiness, and droughtiness preclude agricultural uses. These soils are best used for growing coniferous trees. The bedrock of the Rumsley soil has been quarried. The two known locations of these quarries at the end of Garner Road were indicated by an on-site symbol (see soil map).

Map units

Rumsley soils occur in three map units. It is the dominant soil in the Rumsley (RY) simple map unit and in the Rumsley - Mexicana (RY-ME) compound map unit. In addition, Rumsley occurs as a subdominant soil in the Rock - Rumsley (RO-RY) map unit, which is described elsewhere in Part 4.

Rumsley map unit (RY)

The Rumsley map unit consists dominantly (75-100%) of the well drained Rumsley soils with up to 25% of metamorphosed intrusive bedrock exposed (Rock). The bedrock exposures are more associated with the very shallow lithic Rumsley soil (RYsl) and limit the use interpretations for the RYsl map unit.

Landform and occurrence

The Rumsley map unit (RY and RYsl) occurs in the upland areas with shallow soils over metamorphic bedrock on moderately to extreme sloping (10-70%) topography in hummocky and ridged landscape positions. Bedrock exposures occur at random and are most frequently associated with the very shallow lithic Rumsley soil (RYsl). This map unit occurs at all elevations.

Distribution and extent

The Rumsley map unit (RY and RYsl) is a major one on Saltspring Island, with 59 large-sized delineations, from which most occur on the southern part of the island. Over half (38) of the delineations consist of the very shallow lithic Rumsley soils, mapped as RYsl. The other delineations are mapped as RY. This map unit (both RYsl and RY) occupies an area of 1567 ha (8.4% of total map area).

Rumsley - Mexicana map unit (RY-ME)

The Rumsley - Mexicana map unit consists dominantly (50-75%) of the well drained Rumsley soils with a subdominant proportion (25-50%) of moderately well drained soils developed on gravelly sandy loam to gravelly loam textured morainal deposits over compact, unweathered till within 100 cm (Mexicana soil). The Mexicana soils are not limiting the use interpretations for the RY-ME map unit.

Landform and occurrence

This map unit occurs in the upland areas with shallow soils over metamorphosed intrusive bedrock on moderately to very strongly sloping (10-45%) topography in hummocky and ridged landscape positions. The Mexicana soils occupy side slope positions and isolated pockets where till deposits have been left undisturbed, occurring in areas too small to map separately but adding up to a significant proportion of the map unit. This map unit occurs at all elevations.

Distribution and extent

Rumsley - Mexicana (RY-ME) is a major map unit, with approximately 20 very large-sized delineations, from which all but two occur in the southern part of the island. This map unit occupies an area of 935 ha (5.0% of the total map area).

SALALAKIM SOIL AND MAP UNITS

Salalakim soil (SL)

Salalakim soils are rapidly to well drained gravelly sandy loam textured soils that have developed on shallow colluvial and glacial drift materials of weathered conglomerate over conglomerate bedrock. On Saltspring Island, all occurrences of Salalakim soil have bedrock within 50 cm. Coarse fragment content is between 20 and 50%. The profile description and analyses of a selected Salalakim soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah 0-10 cm
Texture, surface soil (0-30 cm)	: SL (LS-S)
Texture, subsurface soil	: SL (LS-S)
Depth of solum (A and B horizons)	: 40 cm (10-50 cm)
Depth of soil (A, B, and C horizons)	: 45 cm (10-50 cm)
Depth to fractured bedrock	: 45 cm (10-50 cm)

Depth and type of restricting layer : 50 cm (10-50 cm), consolidated bedrock
Effective rooting depth : 20 cm (10-35)
CF content and type (0-30 cm) : 20-50%, gravelly (cobbly)
CF content and type, subsurface : 20-50%, gravelly and cobbly
Perviousness : Rapid
Percolation : Rapid
Soil classification : Orthic Dystric Brunisol

Water regime

Salalakim soils are rapidly to well drained soils. They remain moist throughout the winter months but are droughty from late spring to late fall. During or shortly after wet periods water may move laterally through the subsoil on top of the sloping bedrock.

Variability

The coarse fragment content may exceed 50% in the subsoil. On occasion, the Ah horizon is thicker than 10 cm (Sombric Dystric Brunisol) or a podzolic Bf horizon is present (Orthic Humo-Ferric Podzol). The soil usually has a layer 5 cm thick (0-10 cm) of broken and fractured bedrock on top of the unweathered consolidated bedrock. This layer does not impede root development or water movement. All areas with Salalakim soils have bedrock within 50 cm and are mapped as SLsl. Although the dominant texture is sandy loam, Salalakim soils with loam or loamy sand textures do occasionally occur but not frequently and consistently enough to be mapped separately.

Similar soils

Salalakim soils are similar in drainage and texture to Qualicum soils, which are much deeper (>150 cm). Also, the coarse fragments (gravel and cobbles) in the Salalakim soils are dominantly rounded (pebbles), whereas the coarse fragments in the Qualicum soils are rounded, subrounded, and sometimes irregularly shaped.

Natural vegetation

The natural vegetation consists of coast Douglas fir, scattered Pacific madrone, and some grand fir, with an understory of salal, common gorse, and grasses.

Land use

The use of the Salalakim soils on Saltspring Island is restricted to its natural vegetation. The only potential agricultural use is for sheep grazing in areas dominated by grass vegetation. Salalakim soils and conglomerate bedrock are occasionally used as sources of gravel for road building and construction purposes.

Map units

Salalakim soils occur as the dominant soil in the Salalakim (SL) simple map unit and the Salalakim - Mexicana (SL-ME) compound map unit. They are also a subdominant component in the Rock - Salalakim (RO-SL) map unit, which is described elsewhere in Part 4.

Salalakim map unit (SL)

The Salalakim map unit consists dominantly (75-100%) of the rapidly to well drained Salalakim soil, with bedrock occurring within 50 cm from the surface (SLsl). The map unit may include up to 25% of conglomerate bedrock exposures (Rock), which is a limiting factor in use interpretations for this map unit.

Landform and occurrence

The Salalakim (SLsl) map unit occurs dominantly on steep conglomerate rock ridges (slopes 30-100%) with Salalakim soils occupying the colluvial side slopes, and with bedrock exposures usually occurring on top of the ridges and knolls.

Distribution and extent

The Salalakim (SLsl) map unit is a minor one on Saltspring Island with only six small- to medium-sized delineations mapped in the Mt. Erskine and Mt. Maxwell (Baynes Peak) areas. This map unit occupies an area of 50 ha (0.3% of total map area).

Salalakim - Mexicana map unit (SL-ME)

The Salalakim - Mexicana (SL-ME) map unit consists dominantly (50-75%) of the rapidly to well drained Salalakim soil, with bedrock occurring within 50 cm from the surface (SLsl). The map unit also includes a subdominant proportion (25-50%) of moderately well drained soils developed on gravelly sandy loam to gravelly loam textured morainal deposits over compact, unweathered till within 100 cm (Mexicana soil). Mexicana soils do not limit the use interpretations for this map unit.

Landform and occurrence

This map unit occurs on moderately to very strongly sloping (10-45%) landscape positions in subdued and hummocky upland terrain where Salalakim soils occupy the colluvial side slope positions. Mexicana soils occupy side slope positions and isolated pockets where till deposits have been left undisturbed, occurring as areas too small to map separately but collectively adding up to a significant (25-50%) proportion of the map unit.

Distribution and extent

The Salalakim - Mexicana (SL-ME) map unit is a minor one on Saltspring Island with six large-sized delineations mapped in the Mt. Erskine, Mt. Belcher, and Baynes Peak (Mount Maxwell) areas. They occupy an area of 298 ha (1.6% of total map area of Saltspring Island).

SATURNA SOIL AND MAP UNITS

Saturna soil (ST)

Saturna soils are well drained soils that have developed on shallow deposits of channery sandy loam to channery loamy sand textured colluvial and glacial drift materials over sandstone bedrock within 100 cm. Coarse fragment content varies between 20% and 50%. The profile description and analyses of a selected Saturna soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah 0-10 cm
Texture, surface soil (0-30 cm)	: SL-LS
Texture, subsurface soil	: SL-LS
Depth of solum (A and B horizons)	: 45 cm (25-75 cm)
Depth of soil (A, B, and C horizons)	: 55 cm (25-125 cm)
Depth to fractured bedrock	: 55 cm (10-100 cm)
Depth and type of restricting layer	: 65 cm (25-125 cm), consolidated bedrock
Effective rooting depth	: 45 cm (25-75 cm)
CF content and type (0-30 cm)	: 10-50%, channery and flaggy
CF content and type, subsurface	: 20-50%, channery and flaggy

Perviousness : Rapid
Percolation : Rapid
Soil classification : Orthic Dystric Brunisol

Water regime

The Saturna soils are well drained soils. They are moist throughout the late fall to spring period but droughty during the summer months. During and shortly after wet periods water may flow laterally through the saturated subsoil on top of the sloping bedrock.

Variability

The depth to bedrock is the most variable characteristic in the Saturna soils. Areas in which there is bedrock within 50 cm are mapped as very shallow lithic Saturna soil (STsl), which occurs most frequently. A few areas have bedrock between 50 and 100 cm (STl), and another area has bedrock deeper than 100 cm (STd). All the other areas mapped with Saturna soil have bedrock between 10 and 100 cm (ST). Saturna soils usually have a shallow layer 10 cm thick (5-15 cm) of fractured bedrock (paralithic layer) on top of the solid bedrock. The sandstone fragment content is also variable and is generally higher in the subsoil than in the surface soil, occasionally exceeding the 50%. Some coarse textured Saturna soils are rapidly drained. One area with very shallow lithic Saturna soils has previously been in cultivation but it is now used for hay production. This soil has an Ap horizon thicker than 10 cm and is indicated as STsl,a.

Similar soils

Saturna soils are similar to the Bellhouse soils, which have a thicker (>10 cm) Ah horizon.

Natural vegetation

The natural vegetation consists of coast Douglas fir, scattered Pacific madrone, and some grand fir, with an understory of salal, western bracken, and Oregon grape.

Land use

Generally, no agricultural development has taken place on Saturna soils. On Saltspring Island, one area has been cultivated and is now growing a hay crop. In areas where the vegetation is dominated by grasses, Saturna soils are used for grazing sheep and cattle. These soils are generally not suitable for the production of annual crops because of steep topography, stoniness, shallow soils over bedrock, droughtiness, low fertility, and the frequency of rock outcrops. Despite these limitations, Saturna soils are used by some islanders to produce vegetables. However, this can only be accomplished with high monetary inputs and labor intensive management. Saturna soils are best used for growing coniferous trees.

Map units

Saturna soils occur in four map units. It is the dominant soil in the Saturna (ST) simple map unit and in the Saturna - Mexicana (ST-ME) compound map unit. Saturna is also a subdominant soil in the Rock - Saturna (RO-ST) map unit, which has been described under Rock (RO). In addition, Saturna soils occur as minor soils in the Galiano (GA) map unit.

Saturna map unit (ST)

The Saturna (ST) map unit consists dominantly (75-100%) of the well drained Saturna soils, with up to 25% inclusions of sandstone bedrock exposures (Rock). The bedrock exposures are usually associated with the very shallow lithic Saturna soil (STsl). They are more limiting than the Saturna soils for use interpretations of the map unit.

Landform and occurrence

The soil landscape consists of shallow soils over sandstone bedrock on usually gently to very strongly sloping (6-45%) topography in subdued and hummocky terrain. Occasionally, the Saturna map unit occupies steeper landscape positions such as side slopes (46-100%) of rock ridges. Bedrock exposures occur at random, most frequently in association with the very shallow lithic Saturna soils (STsl).

Distribution and extent

The Saturna (ST) map unit is a major one on Saltspring Island with over 72 medium-sized, often long and narrow delineations, occurring much more frequently in the northern part of the island than in the southern part. Many areas (45) have shallow Saturna soils with bedrock within 50 cm (STsl). Only one STd and two STl delineations have been mapped. The remaining 24 delineations contain Saturna bedrock between 10 and 100 cm (ST). The ST map unit occupies an area of 940 ha (5.1% of total map area).

Saturna - Mexicana map unit (ST-ME)

The Saturna - Mexicana (ST-ME) map unit consists dominantly (50-75%) of the well drained Saturna soils. The map unit also contains a subdominant component (25-50%) of moderately well drained soils developed on gravelly sandy loam to gravelly loam textured morainal deposits over compact, unweathered till within 100 cm (Mexicana soil). Mexicana soils do not limit the use interpretations of the map unit.

Landform and occurrence

The soil landscape consists of shallow soils over sandstone bedrock and till on moderately to very strongly sloping (10-45%) topography in subdued and hummocky terrain. Mexicana soils commonly occupy side slope positions and isolated pockets where till deposits have been protected, occurring in areas too small to map separately but collectively adding up to a significant (25-50%) portion of the map unit.

Distribution and extent

The Saturna - Mexicana map unit is a minor one on Saltspring Island. It occurs as four medium- and large-sized delineations in the northern part only. This map unit occupies an area of 286 ha (1.5% of total map area).

SUFFOLK SOIL AND MAP UNITS

Suffolk soil (SU)

Suffolk soils are imperfectly drained soils that have developed on shallow loam to silty clay loam marine deposits that are usually stone free, overlying gravelly sandy loam to gravelly loam textured compact, unweathered compact till within 100 cm from the surface. The profile description and analyses of a selected Suffolk soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah 0-10 cm (Ap 10-15 cm)
Texture, surface soil (0-30 cm)	: SiL-L
Texture, subsurface soil	: CL-SiCL over SL-L till
Thickness of overlay materials	: 95 cm
Depth of solum (A and B horizons)	: 80 cm (55-110 cm)
Depth of soil (A, B, and C horizons)	: 95 cm (65-125 cm)
Depth to bedrock	: > 125 cm
Depth and type of restricting layer	: 95 cm (65-125 cm), compact till

Effective rooting depth : 45 cm
CF content and type (0-30 cm) : 0-5%, gravelly
CF content and type, subsurface : 0-5%, in till: 15-25%, gravelly
Perviousness : Slow
Percolation : Moderate to slow
Soil classification : Gleyed Dystric Brunisol

Water regime

Suffolk soils are imperfectly drained soils with distinct to prominent mottles between 50 and 100 cm. They are saturated to about 60 cm from the surface during the winter months, often by a perched water table on top of the compact till. The water table drops quickly in spring and droughty conditions may even prevail during extended dry periods in the summer. Occasionally, poorly drained Suffolk soils occur in the lower landscape positions.

Variability

The morphology of the Suffolk soils can be as variable as is described for the Fairbridge soils. A leached Ae horizon and (or) a Btj horizon may occur, but these variations are too inconsistent to map separately. When an Ap horizon thicker than 10 cm is present, the soil is mapped as SUa. One area with a poorly drained Suffolk soil is mapped as SUpd. Another area has Suffolk soils with compact till deeper than 1 m. This area is mapped as a deep Suffolk soil (SUd). The till materials, which are usually weakly cemented, are occasionally moderately cemented in discontinuous layers. The till in the subsoil is the Mexicana-type till.

Similar soils

Suffolk soils are similar to the deeper Fairbridge soils, which do not overlie compact till. Suffolk soils are somewhat similar to St. Mary soils, which have a shallow (30-70 cm) SL-LS capping.

Natural vegetation

The natural vegetation consists of western red cedar, red alder, bigleaf maple, and some coast Douglas fir, with an understory of western sword fern, salal, nettles, and western bracken.

Land use

Like the Fairbridge soils, most of the areas in Suffolk soils on Saltspring Island have been cleared for agriculture. These soils are one of the better agricultural soils on the island. They are used for hay production and pasture but could be used for a larger range of annual crops upon improvement. Because of droughty conditions during the growing season, irrigation is recommended for maximum production. On one farm, just south of St. Mary Lake, two crops of hay each year are harvested because of irrigation.

Map units

The Suffolk soil only occurs as the dominant soil in the Suffolk (SU) map unit.

Suffolk map unit (SU)

The Suffolk map unit consists dominantly (75-100%) of the imperfectly drained Suffolk soils with up to 25% of similar but poorly drained soils. These poorly drained soils are limiting the use interpretations for this map unit.

Landform and occurrence

This map unit occurs in subdued terrain on usually gently to moderately sloping (6-15%) topography but occasionally on steeper sloping (16-30%) topography. Poorly drained inclusions occupy the lower landscape positions. Elevations are usually between 0 and 100 m.

Distribution and extent

The Suffolk map unit is a minor one on Saltspring Island with 21 small delineations, from which 15 were mapped around St. Mary Lake. This map unit occupies an area of 200 ha (1.1% of total map area).

ST. MARY SOIL AND MAP UNITS

St. Mary soil (SM)

St. Mary soils are imperfectly drained soils with 30-70 cm of a sandy loam to loamy sand textured capping of marine or fluvial deposits over 20-50 cm of sandy clay loam to silty clay loam textured, usually stone free, marine deposits underlain by gravelly sandy loam to gravelly loam textured compact, unweathered till within 100 cm. The profile description and analyses of a selected St. Mary soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah 0-10 cm (Ap 10-15 cm)
Texture, surface soil (0-30 cm)	: SL-LS
Texture, subsurface soil	: SCL-SiCL over SL-L till
Thickness of overlay materials	: 30-70 cm, SL-LS 20-50 cm, SCL-SiCL
Depth of solum (A and B horizons)	: 50 cm (30-70 cm)
Depth of soil (A, B, and C horizon)	: 90 cm (50-120 cm)
Depth to bedrock	: > 120 cm
Depth and type of restricting layer	: 90 cm (50-120 cm), compact till
Effective rooting depth	: 50 cm (30-70 cm)
CF content and type (0-30 cm)	: 5% (5-10%), gravelly
CF content and type, subsurface	: 0-5%, but 15-25% in till, gravelly
Perviousness	: Moderate to slow
Percolation	: Moderate to slow
Soil classification	: Gleyed Dystric Brunisol

Water regime

St. Mary soils are imperfectly drained soils that are saturated to about 60 cm from the surface during winter and early spring. The soil receives seepage and runoff water from surrounding upland areas, which maintains the subsoil in a moist condition throughout the summer. The downward movement of water may be restricted by the fine textured, often massive structured subsoil, and deeper by the compact till, creating perched water table conditions. Faint mottling occurs in the lower part of the solum, with distinct to prominent mottles below 50 cm from the surface.

Variability

The most variable characteristic is the thickness of both overlay materials (50-120 cm) and therefore the depth to the compact till. The till materials are usually weakly cemented but can occasionally be moderately cemented. An Ah or Ap horizon thicker than 10 cm may occur (Gleyed Sombric Brunisol), and mapped as SMa. Occasionally, there is a lighter textured second overlay (for example, loam). When the surface soil has a coarse fragment content between 20 and 50%, St. Mary soils are mapped as SMg. The till material in the subsoil is the Mexicana-type till.

Similar soils

St. Mary soils without the SL-LS capping are mapped as Suffolk (SU) soils. When the fine textured marine subsoil is missing and the soil is slightly better drained and more gravelly, it is mapped as Trincomali (TR) soil. Similar imperfectly drained soils without compact till in the subsoil are mapped as Brigantine (BE) soils.

Natural vegetation

The natural vegetation consists of western red cedar, and red alder, and occasionally of bigleaf maple and coast Douglas fir. The understory includes western sword fern, western bracken, and salal.

Land use

Most of the St. Mary soils on Saltspring Island have been cleared from its original vegetation for agricultural use, such as hay and pasture production. This soil is similar to the Brigantine soil, regarding most use interpretations. The St. Mary soils can be improved with irrigation and fertilizer to produce a wide range of agricultural crops and tree fruits. Besides agriculture, growing deciduous trees is another good use for this soil.

Map units

Three map units in which St. Mary soils are dominant were recognized on Saltspring Island. These are the simple St. Mary (SM) map unit and the compound map units St. Mary - Haslam (SM-HA) and St. Mary - Mexicana (SM-ME).

St. Mary map unit (SM)

The St. Mary map unit consists dominantly (75-100%) of imperfectly drained St. Mary soils with up to 25% of similar soils without the sandy loam to loamy sand textured capping (Suffolk soils). The Suffolk soil is not limiting the use interpretations for this map unit.

Landform and occurrence

The St. Mary map unit occurs on gently to moderately sloping (6-15%) topography and occasionally on steeper (16-30%) slopes in subdued terrain. Suffolk soils occur at random in the map unit. Elevations are within 100 m.

Location and extent

St. Mary is a major map unit on Saltspring Island with 19 medium-sized delineations, all but one occurring in the northern part of the island. They occupy an area of 454 ha (2.4% of the total map area).

St. Mary - Haslam map unit (SM-HA)

The St. Mary - Haslam (SM-HA) map unit consists dominantly (50-75%) of imperfectly drained St. Mary soils. The map unit also contains 25-50% of well drained soils developed on shallow, channery, and shaly sandy loam to silt loam textured weathered colluvial, residual, and glacial drift materials over sandstone, siltstone, or shale bedrock within 100 cm. Coarse fragment content is between 20 and 50% (Haslam soils). The Haslam soils are limiting the use interpretations of this map unit.

Landform and occurrence

This map unit occurs in subdued terrain with gently to moderately sloping (6-15%) topography, dissected by a series of narrow ridges with shallow Haslam soils on strongly sloping (16-30%) topography, at elevations between 0 and 100 cm. The narrow ridges with Haslam soils occur as areas too small to map separately.

Distribution and extent

The St. Mary - Haslam (SM-HA) map unit is a minor one on Saltspring Island with four small- to medium-sized delineations occurring in the northern part of the island near St. Mary Lake. This map unit occupies an area of 76 ha (0.4% of the total map area).

St. Mary - Mexicana map unit (SM-ME)

The St. Mary - Mexicana map unit consists dominantly (50-75%) of imperfectly drained St. Mary soils. The map unit also contains 25-50% of moderately well drained soils developed on shallow, gravelly sandy loam to gravelly loam textured morainal deposits over compact, unweathered till within 100 cm (Mexicana soils). The Mexicana soil is limiting most use interpretations for this map unit.

Landform and occurrence

This map unit occurs on moderately to very strongly sloping topography (10-45%), with St. Mary soils occupying the lower landscape positions on gentle to moderate slopes (6-15%). The Mexicana soils occupy the higher and steeper landscape positions (16-45% slopes). Mexicana soils also occur at random where the overlay of marine materials is absent. Elevations are between 0 and 100 m.

Distribution and extent

The St. Mary - Mexicana (SM-ME) map unit is a minor one on Saltspring Island, with seven medium-sized delineations. This map unit occupies an area of 115 ha (0.6% of total map area).

TOLMIE SOIL AND MAP UNITS

Tolmie soil (TL)

Tolmie soils are poorly drained soils that have developed on deep (>100 cm) silt loam to silty clay loam marine deposits that are usually stone free. Sandy, loamy sand, and gravelly materials may occur in pockets or in thin layers throughout the soil profile. The profile description and analyses of a selected Tolmie soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface soil	: Ah or Ap 10-20 cm
Texture, surface soil (0-30 cm)	: L-SiL (SCL-CL)
Texture, subsurface soil	: SiCL-CL (SiC)
Thickness of overlay materials	: Absent
Depth of solum (A and B horizons)	: 60 cm (45-80 cm)
Depth of soil (A, B, and C horizons)	: >100 cm
Depth to bedrock	: >100 cm
Depth and type of restricting layer	: 60 cm (45-80 cm), massive structured Cg horizon
Effective rooting depth	: 60 cm
CF content and type, (0-30 cm)	: 0-5%, gravelly
CF content and type, subsurface	: 0-10%, gravelly
Perviousness	: Slow
Percolation	: Slow
Soil classification	: Orthic Humic Gleysol

Water regime

Tolmie soils are poorly drained soils that have distinct to prominent mottles within 50 cm of the surface. They are wet for long periods throughout the year, with water tables within 30 cm from the surface from late November to early March. In the spring, water tables drop quickly and remain below 50 cm from May to October. Water tables fluctuate rapidly in response to wetness and dryness. Perched water tables can occur temporarily on top of a massive-structured, fine textured subsoil. The Tolmie soils receive runoff water from the surrounding landscape.

Variability

The texture of the Tolmie soil profile can be variable, ranging from a light loam to a heavy silty clay soil, often with coarser textured discontinuous thin layers or pockets. Occasionally, a well-decomposed organic surface layer is present, which is indicated by TLp. In some instances, the Ah or Ap horizon is less than 10 cm thick (Orthic Gleysol). The gravel content is low (< 5%) in the surface, but may increase with depth, occasionally exceeding 10% in subsoils with pockets of gravel. A weakly developed Ae horizon may be present.

Similar soils

Tolmie and Cowichan soils are similar. The Cowichan soils are also poorly drained, silt loam to silty clay loam textured marine soils. They have a more uniform and often finer texture than the Tolmie soils. Without evidence of a clear Ae or Bt horizon, Cowichan-like soils have been mapped as Tolmie soils. Also, soils with similar morphology as Cowichan soils but with variable textures (for example, coarse textured materials in discontinuous thin layers or pockets) have been mapped as Tolmie soils.

Natural vegetation

The natural vegetation on Tolmie soils consists of western red cedar, red alder, and bigleaf maple. The understory includes western sword fern, sedges, horsetail, western bracken, and in the wettest landscape positions often American skunk cabbage.

Land use

Most of the Tolmie soils on Saltspring Island occupying large areas have been cleared for agricultural production. They are one of the best agricultural soils on Saltspring Island when drainage is improved. The surface soil is well supplied with organic matter and nitrogen. The soil is strongly to moderately acid (pH 5.1-6.0), and responds favorably to fertilizers. A commercial fruit and vegetable farm is located on Tolmie soils. The unimproved agricultural land use is usually pasture and hay crops.

Map units

Tolmie soils are the dominant soils in the Tolmie (TL) simple map unit. Tolmie is a subdominant soil in the Brigantine - Tolmie (BE-TL) and in the Parksville - Tolmie (PA-TL) compound map units, which have been described under BE and PA. Tolmie soils are minor soils in the Cowichan (CO) and Fairbridge (FB) map units.

Tolmie map unit (TL)

The Tolmie map unit consists dominantly (65-100%) of the poorly drained Tolmie soil with up to 35% of similar poorly drained but more uniformly textured soils without coarse textured materials in its profile (Cowichan soil).

Landform and occurrence

The Tolmie landscape consists of depressions, basins, swales, and drainageways with nearly level to gently sloping (0.5-9%) topography, in which Cowichan soils occur at random. Elevations are usually between 0 and 100 m.

Distribution and extent

The Tolmie map unit has been frequently mapped on Saltspring Island, with 74 small-sized, usually narrow and long delineations throughout the map area. The map unit occupies an area of 330 ha (1.8% of total map area).

TRINCOMALI SOIL AND MAP UNITS

Trincomali soil (TR)

Trincomali soils are moderately well drained soils that have developed on shallow (30-100 cm) deposits of gravelly sandy loam to gravelly loamy sand textured marine, fluvial, or glaciofluvial materials (15-50% gravels) over gravelly sandy loam to gravelly loam textured compact, unweathered till within 100 cm. The profile description and analyses of a selected Trincomali soil are in the Appendix.

Ranges in soil characteristics

Thickness of surface : Ah 0-10 cm (Ap 10-15 cm)
Texture, surface soil (0-30 cm) : SL-LS
Texture, subsurface soil : SL-LS over SL-L till
Thickness of overlay materials : 65 cm (45-120 cm)
Depth of solum (A and B horizons) : 60 cm (40-80 cm)
Depth of soil (A, B, and C horizon) : 65 cm (45-120 cm)
Depth to bedrock : > 120 cm
Depth and type of restricting layer : 65 cm (45-120 cm), compact till
Effective rooting depth : 60 cm
CF content and type (0-30 cm) : 25% (15-50%), gravelly and angular gravelly
CF content and type, subsurface : 30% (20-50%), gravelly
Perviousness : Slow
Percolation : Rapid in solum, very slow in till (6.5 min/cm)
Soil classification : Orthic Dystric Brunisol

Water regime

Trincomali soils are moderately well drained. After prolonged wetting, perched water table conditions are common on top of the compact till (at 65 cm) for short periods of time. Consequently, faint mottling is often found in the lower part of the solum directly above the till. During the dry periods in summer the soil is very droughty.

Variability

The thickness of the overlay materials can vary considerably (45-120 cm), but it is usually less than 100 cm. Ah and Ap horizons thicker than 10 cm are indicated as TRa. Occasionally, a podzolic Bf horizon is present, which changes the classification into an Orthic Humo-Ferric Podzol. This variation is too inconsistent to express in the map symbol. The Mexicana-type till material in the subsoil usually has less than 20% clay and is often weakly (occasionally moderately) cemented.

Similar soils

Trincomali soils often occur together with Qualicum soils, which are deeper and better drained. Trincomali soils with overlays thicker than 150 cm have been mapped as Qualicum soils. Trincomali soils also occur together with Mexicana soils that have developed on till without the somewhat coarser textured overlay materials (see ME-TR map unit). When the sandy loam to loamy sand textured deposits over till are less than 30 cm thick, these soils are part of the Mexicana (ME) map unit.

Natural vegetation

The natural vegetation consists of coast Douglas fir, with some grand fir and scattered Pacific madrone. The understory consists of salal, western bracken, and Oregon grape.

Land use

Only small areas with Trincomali soils have been cleared for agriculture on Saltspring Island. These are being used for grazing sheep and horses. The main limiting factors for more intensive agriculture on these soils are stoniness, droughtiness, and topography. In addition, the soils are very strongly acid to strongly acid (pH 4.6-5.5), and they have a low inherent fertility. The best use for these soils is for growing coniferous trees.

Map units

Trincomali soils occur as the dominant soil in the Trincomali (TR) simple map unit. They are a subdominant soil in the Mexicana - Trincomali (ME-TR) map unit, which is described under ME. Trincomali is a minor soil in the Qualicum (QU) map unit.

Trincomali map unit (TR)

The Trincomali (TR) map unit consists dominantly (65-100%) of the moderately well drained Trincomali soils with up to 35% inclusions of similar textured but deeper (>150 cm) and better drained soils (Qualicum soils). The Qualicum soils do not affect the use interpretations for the map unit.

Landform and occurrence

The Trincomali landscape consists of shallow beach, terrace, or outwash deposits over till, usually near or at the shoreline or along drainageways. Trincomali map unit (TR) occurs on gently to strongly sloping (6-30%) topography but occasionally on steeper slopes (31-45%). Qualicum soils occur at random where the coarse textured deposits are deeper than 150 cm.

Distribution and extent

The Trincomali map unit on Saltspring Island has 39 small- to medium-sixed delineations, from which most were mapped throughout the northern part of the island. This map unit occupies an area of 446 ha (2.4% of total map area).

Summary of aerial extent of map units on Saltspring Island

When the map units discussed in Part 4 and listed in Table 5 are grouped by the origin of parent materials and/or parent material textures of the dominant soils, some comparisons can be made about the distribution of these groups of map units on Saltspring Island. Map units dominated by shallow colluvial soils over bedrock within 1 m (for example, BH, GA, and GA-ME) comprise almost half of the mapped area of Saltspring Island (49.2%). Rock-dominated map units occupy 14.7% of the total mapped area, whereas map units dominated by shallow soils over compact glacial till within 1 m (for example, ME, ME-TR, and SM) comprise 17.2% of the total area of Saltspring Island. These three groups of map units together, which are dominated by shallow soils and rock, cover 81% of Saltspring Island. Map units with dominantly deep, moderately fine to fine textured soils (CF, CO, FB, and TL) occupy 7.7% of the total mapped area. Map units with dominantly deep, coarse to moderately coarse textured soils (BD and QU) occupy 4.0% of Saltspring Island. Map units dominated by coarse to moderately coarse textured materials over deep, moderately fine to fine textured materials (BE and PA) comprise 4.2% of the total area. The MT and NT map units cover 1% of the total area. Collectively, these groups of map units with dominantly deep soils occupy 17% of Saltspring Island. The remaining 2% of Saltspring Island consists of land types such as MD, TF, and W.

PART 5. LAND USE INTERPRETATIONS

The application of soil survey information is often required by the users of soil maps and reports. For Saltspring Island, the main users are land use planners. Information about soils, therefore, has to be interpreted for different uses. Two kinds of land use interpretations have been identified for this soil survey:

1. Land constraints for septic tank effluent absorption.
2. Land capability for agriculture.

In the following sections these two land use interpretations are described, and map unit ratings are presented in table format.

However, the map unit interpretations in the following tables cannot be regarded as site-specific. Not all the land limitations mentioned in the text or in the tables may be encountered in any particular location. These sections should be used as a guide to the types of limitations (problems) that could be encountered. Whether they will be encountered or not, and how difficult they may be to overcome in a particular location, must be determined by on-site inspections.

Land constraints for septic tank effluent absorption

On Saltspring Island, sewage disposal is handled by septic tanks and effluent absorption fields. With increasing pressure for residental development it is important to know the constraints or limitations the soil-landscape properties of each map unit impose on septic tank effluent absorption. Soil characteristics more than any other factor, determine the success or failure of septic tank absorption field performance. If an absorption field is to function properly, the soil must do three things: it must first accept the effluent, then treat it, and finally dispose of it.

Interpretations for septic tank effluent absorption are based on a number of soil and landscape properties. Four constraint classes (slight, moderate, severe, and very severe) have been defined to indicate problems or potential problems with effluent absorption due to the soil and landscape characteristics (Epp 1984). A rating of slight indicates that the soil is well suited for effluent absorption. As the severity of the constraint class increases from slight to very severe, there is an increase in the design and maintenance requirements for septic tank disposal. Soils within a constraint class are similar in the degree of limitations but the kind of limitation (for example, depth to bedrock or drainage) may be different.

For Saltspring Island the following six soil-landscape properties were used to indicate the limitations for septic tank effluent absorption (Epp 1984):

D DEPTH TO RESTRICTED LAYERS: Layers with low permeability near the surface limit the thickness of material available for effluent treatment and may result in saturated conditions in the overlying soil (for example, compact till and massive-structured horizons).
G COARSE FRAGMENT CONTENT: Coarse fragment content reduces the effectiveness of the soil for effluent treatment.
R DEPTH TO BEDROCK: Bedrock near the surface limits the thickness of material available for effluent treatment and may result in saturated conditions in the overlying soil.
S SOIL TEXTURE: This is not a major property for determining effluent disposal but rather an important factor that influences soil permeability.
TTOPOGRAPHY: Steepness and pattern of slopes limit effluent disposal.
W SOIL DRAINAGE: The rapidity and extent of water removal from the soil in relation to additions is important.

The methods, assumptions, definitions, and symbols for constraint classes and properties used in determining effluent absorption constraints are defined in MOE Manual 5 (Epp 1984).

The constraint class and soil-landscape limitations for septic tank effluent absorption are listed for each map unit in Table 6. The constraint class is determined by the most limiting soil-landscape property (or properties). These properties are indicated in capital letters behind the constraint class. Also, those limiting properties that occur at the next lower constraint class are indicated by a lowercase letter behind the ones indicated in capital letters. A maximum of three limitations per constraint class are presented in Table 6.

The typical constraint classes for effluent absorption in columns 4 and 5 of Table 6 are based on the dominant occurrence of the limiting soil-landscape properties for the map unit as indicated in the map unit legend. Where there is a range defined for a given property, for example slope or coarse fragment content, the midpoint of the range is used to determine the typical constraint class. For compound map units the proportion of dominant and subdominant soils is assumed to be 60% and 40%, respectively, although for a specific delineation the actual proportions may vary within the limits indicated in the legend. Where inclusions of minor soils have been described, the proportion of minor soils is assumed to be 20%. In some delineations the proportion of minor soils may vary from this assumed proportion. For these map unit examples, the proportions are represented by the superscripts 6,4 and 8,2, respectively, for the ratings in Table 6.

For some delineations the constraint class may differ from the typical constraint class for one or more reasons. For example, slopes may be more or less steep than for the typical rating. Also, the range of slopes occurring in some delineations may span more than one constraint class. Therefore, columns 6, 7, and 8 of Table 6 indicate variations from the typical rating because of changes in slope class. Also, the described range in soil properties such as coarse fragment content, texture, drainage, depth to bedrock, or other restricting layers may cover more than one constraint class. Variations in soil properties as indicated by the soil phase symbol do occur, such as texture, coarse fragment content, depth to bedrock, or presence of an organic capping. Where the occurrence of a soil phase results in the constraint rating of the map unit being different from the typical rating, this variation, along with the soil phase, is indicated in columns 9, 10, and 11 of Table 6. In addition, inclusions of unmappable (due to scale) soils, or variations in the proportion of dominant, subdominant, and minor soils do occur for some delineations. These types of variations could not be expressed in the table.

The ratings in Table 6 are to be used as a guide only. They are not delineation-specific and therefore do not eliminate the need for detailed on-site investigations.

Results of Table 6 indicate that none of the map units for Saltspring Island, whether typical or with variations due to slope or to soil properties, have a slight constraint rating for effluent absorption. Only one, the Beddis (BD) map unit, has moderate limitations for effluent absorption for typical map unit conditions. However, Beddis map units consisting of dominantly sandy loam instead of loamy sand soils have only slight limitations for effluent absorption on slopes of less than 10%. Also, the Qualicum (QU), Saturna deep (STd), Suffolk deep (SUd), and Trincomali deep (TRd) map units on moderate slopes (10-15%) all have moderate limitations for effluent absorption. All other map units occurring on Saltspring Island, including the foregoing map units on steeper topography (> 15%), fall into the severe and very severe constraint classes for septic tank effluent absorption.

Table 6. Constraint classes and soil-landscape limitations for septic tank effluent absorption

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
BD	Beddis	4	Moderate	SW^8-GSW^2	3	Moderate	SW^8-GSW^2	BDg	Moderate	GS
					5	Moderate	STW^8-GTW^2	BDg,id	Severe	Wgs
					6	Severe	Ts^8-Tgw^2	BDid,lo	Severe	W
					7	Very severe	T	BDl	Severe	Rs
BE	Brigantine	4	Severe^8-very severe^2	DW^8-Wd^2	5	Severe^8-very severe^2	DWt^8-Wd^2	BEd	Severe	Wd
					6	Severe^8-very severe^2	DTW^8-Wd^2	BEd,g	Severe	Wdg
BE-TL	Brigantine-Tolmie	3	Severe^6 very severe^4	DW^6-Wd^4	5	Severe^6-very severe^4	DWt^6-Wd^4			
BH	Bellhouse	6	Very severe	Rt	4,5	Very severe	R			
CF	Crofton	2-3	Very severe	W	4,5	Very severe	W			
					6	Severe	TW			
CO	Cowichan	2-3	Very severe	Ws						
CO-FB	Cowichan-Fairbridge	2-3	Very severe^6-severe^4	Ws^6-SW^4	3,4	Very severe^6-severe^4	Ws^6-SW^4			

Table 6. Constraint classes and soil-landscape limitations for septic tank effluent absorption (continued)

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
FB	Fairbridge	4	Severe^8-very severe^2	SW^8-Ws^2	3,5	Severe^8-very severe^2	SW^8-Ws^2	FBl	Severe^8-very severe^2	RSW^8-Wrs^2
GA	Galiano	6	Severe^8-very severe^2	RTg^8-Rt^2	4	Severe^8-very severe^2	Rg^8-R^2	GAsl	Very severe	Rt
					5	Severe^8-very severe^2	Rgt^8-R^2			
					7,8,9	Very severe	Tr			
GA-ME	Galiano-Mexicana	6	Severe	RTg^6-DTw^4	4	Severe	Rg^6-Dgw^4	GAsl-ME	Very severe^6-severe^4	Rt^6-DTg^4
					5	Severe	Rgt^6-Dtw^4			
					7,8	Very severe	Tr^6-Td^4			
HA	Haslam	6	Severe^8-very severe	RTg^8-Rt^2	4	Severe^8-very severe^2	Rg^8-R^2	HAsl	Very severe	Rt
					5	Severe^8-very severe^2	Rgt^8-R^2	HAl	Severe^8-very severe^2	RTg^8-Rt^2
					7,8,9	Very severe	Tr^8-RT^2			
HA-BE	Haslam-Brigantine	5	Severe	Rgt^6-DWt^4	6	Severe	RTg^6-DWt^4			
					7,8,9	Very severe^6-severe^4	Tr^6-DWt^4			
HA-CO	Haslam-Cowichan	4-5	Severe^6-very severe^4	Rgt^6-Ws^4	6	Severe^6-very severe^4	RTg^6-Ws^4			

Table 6. Constraint classes and soil-landscape limitations for septic tank effluent absorption (continued)

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
HA-QU	Haslam-Qualicum	6	Severe	RTg^{6}-Tgw^{4}	4,5	Severe^{6}-moderate^{4}	Rgt^{6}-GSW^{4}	HA-QU1	Severe	RTw
					7	Very severe	Tr			
ME	Mexicana	5	Severe	Dtw	3,4	Severe	Dgw	MEid	Severe	DWt
					6	Severe	DTw			
					7	Very severe	Td			
ME-TR	Mexicana-Trincomali	5	Severe	Dtw	3,4	Severe	Dgw	ME-TRd	Severe^{6}-moderate^{4}	Dtw^{6}-DTW^{4}
					6	Severe	DTw			
					7,8,9	Very severe	Td			
MG	Musgrave	6	Severe^{8}-very severe^{2}	RTg^{8}-Rt^{2}	4	Severe^{8}-very severe^{2}	Rg^{8}-R^{2}	MGs1	Very severe	Rt
					5	Severe^{8}-very severe^{2}	Rgt^{8}-R^{2}			
					7,8,9	Very severe	Tr^{8}-RT^{2}			
MG-ME	Musgrave-Mexicana	5	Severe	Rgt^{6}-Dtw^{4}	6	Severe	RTg^{6}-DTw^{4}			
					7,8,9	Very severe	Tr^{6}-Td^{4}			
MT	Metchosin	1	Very severe	W				MTso,vg	Very severe	Wdg
NT	Neptune	3	Severe	Rgs						

Table 6. Constraint classes and soil-landscape limitations for septic tank effluent absorption (continued)

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
PA	Parksville	3	Very severe^8-severe^2	Wd^8-DW^2						
PA-TL	Parksville-Tolmie	3	Very severe	Wd^6-W^4	4,5	Very severe	Wd^6-W^4			
QU	Qualicum	6	Severe	Tgw^8-DTw^2	4	Moderate^8-severe^2	GSW^8-Dgw^2	QUl,a	Severe	RTw^8-DTw^2
					5	Moderate^8-severe^2	GTW^8-Dtw^2	QUvg,a	Severe	GTw^8-DTw^2
					7,8	Very severe	T^8-Td^2			
RO	Rock	7,8,9,10	Very severe	RT	3,4,5	Very severe	R			
					6	Very severe	Rt			
RO-HA	Rock-Haslam	7,8,9	Very severe	RT	5	Very severe	R			
					6	Very severe	Rt			
RO-MG	Rock-Musgrave	6	Very severe	Rt	5	Very severe	R			
					7,8,9	Very severe	Rt			
RO-RY	Rock-Rumsley	6	Very severe	Rt	5	Very severe	R			
					7,8,9	Very severe	Rt			
RO-SL	Rock-Salalakim	6	Very severe	Rt	5	Very severe	R			
					7,8,9	Very severe	RT			

Table 6. Constraint classes and soil-landscape limitations for septic tank effluent absorption (continued)

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
RO-ST	Rock-Saturna	6	Very severe	Rt	4,5	Very severe	R			
					7,8,9	Very severe	RT			
RY	Rumsley	6	Severe^{8}-very severe^{2}	RTg^{8}-Rt^{2}	4	Severe^{8}-very severe^{2}	Rg^{8}-R^{2}	RYsl	Very severe	Rt
					5	Severe^{8}-very severe^{2}	Rgt^{8}-R^{2}			
					7,8,9	Very severe	Tr^{8}-RT^{2}			
RY-ME	Rumsley-Mexicana	5	Severe	Rgt^{6}-Dtw^{4}	4	Severe	Rg^{6}-Dgw^{4}			
					6	Severe	RTg^{6}-DTw^{4}			
					7	Very severe	Tr^{6}-Td^{4}			
SL	Salalakim	7,8,9,10	Very severe	RT	5	Very severe	R			
					6	Very severe	Rt			
SL-ME	Salalakim-Mexicana	5	Very severe^{6}-severe^{4}	R^{6}-Dtw^{4}	4	Very severe^{6}-severe^{4}	R^{6}-Dgw^{4}			
					6	Very severe^{6}-severe^{4}	Rt^{6}-DTw^{4}			
					7,8	Very severe	RT^{6}-Td^{4}			
SM	St. Mary	4,5	Severe	DW^{8}-DWs^{2}	6	Severe	DTW			
SM-HA	St. Mary-Haslam	5	Severe	DWt^{6}-Rgt^{4}	6	Severe	DTW^{6}-RTg^{4}			

Table 6. Constraint classes and soil-landscape limitations for septic tank effluent absorption (concluded)

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
SM-ME	St. Mary-Mexicana	5	Severe	DWt^6-Dtw^4	4	Severe	DW^6-Dgw^4			
					6	Severe	DTW^6-DTw^4			
					7	Very severe	Tdw^6-Td^4			
ST	Saturna	6	Severe^8-very severe^2	RTg^8-Rt^2	4	Severe^8-very severe^2	Rg^8-R^2	STsl	Very severe	Rt
					5	Severe^8-very severe^2	Rgt^8-R^2	STl	Severe^8-very severe^2	RTg^8-Rt^2
					7,8,9	Very severe	Tr^8-RT^2	STd	Moderate	GRT
ST-ME	Saturna-Mexicana	6	Severe	RTg^6-DTw^4	3,4	Severe	Rg^6-Dgw^4			
					5	Severe	Rgt^6-Dtw^4			
					7	Very severe	Tr^6-Td^4			
SU	Suffolk	3,4	Severe^8-very severe^2	DWs^8-Wd^2	5	Severe^8-very severe^2	DWt^8-Wd^2	SUd	Moderate	DWs
					6	Severe^8-very severe^2	DTW^8-Wdt^2	SUpd,a	Very severe	Wd
TL	Tolmie	2,3	Very severe	W	4,5	Very severe	W			
TR	Trincomali	5	Severe-moderate	Dtw^8-GTW^2	4	Severe^8-moderate^2	Dgw^8-GSW^2	TRd	Moderate	DTW^8-GTW^2
					6	Severe	DTw^8-Tgw^2	TRid	Severe	DWg
					7	Very severe	Td^8-T^2			

* See map legend

Land capability for agriculture

Land in the agricultural land reserve accounts for almost 20% of the total surveyed area. With increasing land pressures for uses other than agriculture (for example, residential development) it is important for planning purposes to know the agricultural capability class for the map units recognized on Saltspring Island. This section evaluates the soil-landscape properties for the map units to determine soil-landscape limitations for agriculture capability.

Land capability ratings for agriculture are interpretations based on climatic, soil, and landscape characteristics. The Land Capability Classification for Agriculture in British Columbia (Kenk and Cotic 1983) groups soils into seven classes on the basis of the range of regionally adapted crops that can be grown and/or the intensity of management inputs required to maintain crop production. Class 1 soils are considered to have no limitations for crop production. As the class level increases from one to seven, the level of management input increases and the range of suitable crops decreases. Class 7 soils are considered to have no potential for natural grazing or arable crop production. Soils within a class are similar in the degree of limitation but the kind of limitation may be different. The subclasses indicate the nature of the soil limitations (Kenk and Cotic 1983).

For Saltspring Island, the following six land capability subclasses were used to describe the soil-landscape limitations for agriculture capability:

A SOIL MOISTURE DEFICIENCY: Crops are adversely affected by droughtiness caused by soil and/or climate characteristics. Improvable by irrigation.

D UNDESIRABLE SOIL STRUCTURE AND/OR LOW PERVIOUSNESS: Soils are difficult to till, require special management for seedbed preparation, pose trafficability problems, have insufficent aeration, absorb and distribute water slowly, and/or have the depth of rooting zone restricted by conditions other than high water table, bedrock, or permafrost. Improvement practices vary, no improvement is assumed in the absence of local experience.

P STONINESS: Coarse fragments significantly hinder tillage, planting, and harvesting operations. Improvable by stone picking.

R DEPTH TO SOLID BEDROCK AND/OR ROCKINESS: Bedrock near the surface and/or rock outcrops restrict rooting depth and cultivation. Not improvable.

T TOPOGRAPHY: Steepness or the pattern of slopes limits agricultural use. Not improvable.

W EXCESS WATER: Excess free water, other than from flooding, limits agricultural use and may be due to poor drainage, high water tables, seepage, and/or runoff from surrounding areas. Improvable by drainage; feasibility and level of improvement is assessed on a site-specific basis.

The methods, assumptions, definitions, and symbols for classes and subclasses used in determining the agriculture capability ratings are described in MOE Manual 1 (Kenk and Cotic 1983).

In determining the agriculture capability, climatic limitations are evaluated first and if there are no limitations due to soil or landscape characteristics then the regional climate determines the agricultural capability class.

For Saltspring Island the climatic moisture deficit (CMD) is the limiting climatic parameter for agriculture capability. Based on the precipitation and potential evaporation data by Coligado (1979) presented in Table 3 of this report, the CMD was calculated at 203-234 mm during the growing season. This represents a Class 4 climate in the Climatic Capability Classification for Agriculture in British Columbia (Air Studies Branch 1981).

The capability class and soil-landscape limitations (subclasses) for agriculture capability are listed for each map unit in Table 7. The capability class is determined by the most limiting soil-landscape property (or properties). These properties are indicated in capital letters behind the numerical capability class. Also, those limiting properties that occur at the next lower capability class are indicated by a lowercase letter behind the ones indicated in capital letters. A maximum of three limitations per capability class are presented in Table 7.

The typical agriculture capability ratings in columns 4 and 5 of Table 7 are based on the dominant occurrence of the limiting soil-landscape properties for each of the map units as indicated in the map legend. Where there is a range defined for a given property, for example slope or coarse fragment content, the midpoint of the range is used. Column 4 gives the unimproved rating. For some soils the capability can be improved through management practices such as irrigation, drainage, and stone picking, which is indicated by the improved ratings in column 5. For compound map units the proportion of dominant and subdominant soils is assumed to be 60% and 40%, respectively, although for a specific delineation the actual proportions may vary within the limits indicated in the legend. Where inclusions of minor soils have been described, the proportion of minor soils is assumed to be 20%. In some delineations, the proportion of minor soils may vary from this assumed proportion. For the foregoing two examples the proportions are represented by the superscripts 6,4 and 8,2, respectively, for the ratings in Table 7.

For some delineations, the agriculture capability may differ from the typical capability rating for one or more reasons. For example, slopes may be more or less steep than for the typical rating. Also, the range of slopes occurring in some delineations may span more than one agricultural capability class. Therefore, columns 6, 7, and 8 of Table 7 indicate the variations from the typical rating due to changes in slope class. Also, the described range in soil properties, such as coarse fragment content, may cover more than one capability class. Variations in soil properties, such as texture, coarse fragment content, depth to bedrock, and presence of an organic capping, do occur for some delineations. These are indicated by the soil phase symbol. Where the occurrence of a soil phase results in the agricultural capability of the map unit being different from the typical rating, this variation, along with the soil phase is indicated in columns 9, 10 and 11 of Table 7. In addition, inclusions of unmappable (due to scale) soils, or variations in the proportion of dominant, subdominant, and minor soils do occur for some delineations. These types of variations could not be expressed in the table.

The ratings in Table 7 are to be used as a guide only. They are not delineation-specific and therefore do not eliminate the need for detailed on-site investigations.

Results of agriculture capability ratings in Table 7 show that map units with soils that have the least degree of limitation for agricultural crop production are generally found at the lower elevations (<100 m) on gently sloping terrain or in valley bottoms. Most of these soils have developed on deep marine deposits with a low coarse fragment content. Some of these map units comprise the following soils: Beddis, Brigantine, Crofton, Cowichan, Fairbridge, Parksville, and Tolmie. Similar soils with compact till occurring between 50 and 100 cm (St. Mary and Suffolk) fall into the same category.

Map units with soils that have more severe limitations for agricultural crop production are generally found at the higher elevations and on more steeply sloping terrain. Most of these soils are shallow to bedrock or to compact till, because they have developed on colluvial and glacial drift materials. They usually have a high percentage of coarse fragments. The fact that these soils are difficult or impossible to improve realistically is indicated by the improved ratings (Table 7) as being the same as the unimproved ratings. Some of these map units comprise the following soils: Bellhouse, Galiano, Haslam complex, Musgrave, Rumsley, Salalakim, and Saturna soils. Agricultural uses on these soils are restricted to natural grazing, the production of perennial forage crops, or other specially adapted crops, such as tree fruits and grapes.

Table 7. Land capability for agriculture

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
BD	Beddis	4	3Apt^{8}-4AP^{2}	2APT^{8}-3AP^{2}	3 5 6 7	3Ap^{8}-4AP^{2} 3ATp^{8}-4APt^{2} 4Ta^{8}-4APT^{2} 7T	2AP^{8}-3AP^{2} 3Tap^{8}-3APT^{2} 4T^{8}-4Tpa 7T	BDg BDg,id BDid,lo BD1	4AP 4AP 3Atw 3ARt	3APT 3APt 2TA 3Rat
BE	Brigantine	4	3Apt^{8}-4W^{2}	2APT^{8}-2ADW^{2}	3 5 6	3Ap^{8}-4W^{2} 3ATp^{8}-4W^{2} 4Ta^{8}-4W^{2}	2AP^{8}-2ADW^{2} 3Tap^{8}-2ADW^{2} 4T^{8}-2ADW^{2}	BEg	4AP^{8}-4W^{2}	3APt^{8}-2ADW^{2}
BE-TL	Brigantine-Tolmie	3	3Ap^{6}-4W^{4}	2AP^{6}-2DW^{4}	4 5	3Atw^{6}-4W^{4} 3AT^{6}-4W^{4}	2AT^{6}-2DW^{4} 3Ta^{6}-2DW^{4}	BEg-TL	4AP^{6}-4W^{4}	3APt^{6}-2DW^{4}
BH	Bellhouse	6	5RTp^{8}-7R^{2}	5RT^{8}-7R^{2}	4 5	4ARt^{8}-7R^{2} 4ART^{8}-7R^{2}	4Rat^{8}-7R^{2} 4RTa^{8}-7R^{2}			
CF	Crofton	2-3	5W^{8}-3A^{2}	3W^{8} -1^{2}	4 5 6	5W^{8}-3AT^{2} 5W^{8}-3AT^{2} 5T	3Wt-2T 3TW-3T 5T			
CO	Cowichan	2-3	4W	2DW	4	4W	2DTW	COp	5W	3DW
CO-FB	Cowichan-Fairbridge	2-3	4W^{6}-3Adt^{4}	2DW^{6}-2D^{4}	3-4	4W^{6}-3At^{4}	2DW^{6}-2DTW^{4}			

Table 7. Land capability for agriculture (continued)

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
FB	Fairbridge	4	3Adt^{8}-4W^{2}	2DT^{8}-2DW^{2}	3 5	3Ad^{8}-4W^{2} 3ATd^{8}-4W^{2}	2D^{8}-2DW^{2} 3Td^{8}-2DW^{2}	FBl	3Art^{8}-4W^{2}	2DRT^{8}-2DW^{2}
GA	Galiano	6	5T^{8}-7R^{2}	5T^{8}-7R^{2}	4 5 7,8,9	3APt^{8}-7R^{2} 3APT^{8}-7R^{2} 7T^{8}-7RT^{2}	2PT^{8}-7R^{2} 3Tp^{8}-7R^{2} 7T^{8}-7RT^{2}	GAsl	5TR^{8}-7R^{2}	5TR^{8}-7R^{2}
GA-ME	Galiano-Mexicana	6	5T	5T	4 5 7,8	3APt^{6}-3APt^{4} 3APT-3PT^{4} 7T	2PT^{6}-2APT^{4} 3Tp^{6}-3Tap^{4} 7T	GAsl-ME	5TR^{6}-5T^{4}	5TR^{6}-5T^{4}
HA	Haslam	6	5Tp^{8}-7R^{2}	5T^{8}-7R^{2}	4 5 7,8,9	4Pa^{8}- 7R^{2} 4Pat^{8}- 7R^{2} 7T^{8}- 7RT^{2}	4Pa^{8}-7R^{2} 4Pat^{8}-7R^{2} 7T^{8}-7RT^{2}	HAsl	5RTp^{8}-7R^{2}	5RT^{8}-7R^{2}
HA-BE	Haslam-Brigantine	5	4Pat^{6}-3Apt^{4}	4Pat^{6}-2APT^{4}	3-4 6 7,8,9	4Pa^{6}-3Apt^{4} 5Tp^{6}-3Apt^{4} 7T^{6}-3At w^{4}	4Pa^{6}-2APT^{4} 5T^{6}-2APT^{4} 7T^{6}-2AT^{4}			
HA-CO	Haslam-Cowichan	4-5	4Pat^{6}-4W^{4}	4Pat^{6}-2DW^{4}	5-6	4PTa^{6}-4W^{4}	4PTa^{6}-2DW^{4}			
HA-QU	Haslam-Qualicum	6	5Tp^{6}-4APT^{4}	5T^{6}- 4PTa^{4}	4 5 7	4Pa^{6}-4AP^{4} 4Pat^{6}-4APt^{4} 7T	4Pat^{6}-4Pa^{4} 4Pat 7T			

Table 7. Land capability for agriculture (continued)

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
ME	Mexicana	5	3APT	3Tap	3 4 6 7	3AP 3APt 4Tap 7T	2AP 2APT 4T 7T			
ME-TR	Mexicana-Trincomali	5	3APT^6-4APt^4	3Tap^6-4Pat^4	3 4 6 7,8,9	3AP^6-4AP^4 3APt^6-4AP^4 4Tap^6-4APT^4 7T	2AP^6-4Pa^4 2APT^6-4Pa^4 4T^6-4Tap^4 7T			
MG	Musgrave	6	5Tap^8-7R^2	5Tp^8-7R^2	4 5 7,8,9	4AP^8-7R^2 4APt^8-7R^2 7T^8-7RT^2	4Pa^8-7R^2 4Pat^8-7R^2 7T^8-7RT^2	MGs1	5RTp^8-7R^2	5RTp^8-7R^2
MG-ME	Musgrave-Mexicana	5	4APt^6-3APT^4	4Pat^6-3Tap^4	6 7,8,9	5Tap^6-5T^4 7T	5Tp^6-5T^4 7T			
MT	Metchosin	1	O5W	O3W	2	O5W	O3W	MTso,vg	O5PW	O4PW
NT	Neptune	3	4AP	3AP	2	4AP	3AP			
PA	Parksville	3	4W^8-3Ap^2	2ADW^8-2AP^2	4	4W^8-3Apt^2	2ADT-2APT^2	PA1	4W^8-3Ap^2	2ADR^8-2APR^2
PA-TL	Parksville Tolmie	3	4W	2ADW^6-2DW^4	4 5	4W 4Wt	2ADT^6-2DTW^4 3Tad^6-3Tdw^4			

Table 7. Land capability for agriculture (continued)

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
QU	Qualicum	6	5Tap	5Tp	4	4AP	4Pa	QUvg	5APT	5APT
					5	4APt	4Pat			
					7,8	7T	7T			
RO	Rock	7,8,9,10	7RT	7RT	3,4	7R^{8}-4AP^{2}	7R^{8}-4Pa^{2}			
					5	7R^{8}-4APt^{2}	7R^{8}-4Pat^{2}			
					6	7R^{8}-5Tap^{2}	7R^{8}-5Tp^{2}			
RO-HA	Rock-Haslam	7,8,9	7RT^{6}-7T^{4}	7RT^{6}-7T^{4}	5	7R^{6}-4Pat^{4}	7R^{6}-4Pat^{4}			
					6	7R^{6}-5RTp^{4}	7R^{6}-5RTp^{4}			
RO-MG	Rock-Musgrave	6	7R^{6}-5RTp^{4}	7R^{6}-5RTp^{4}	5	7R^{6}-4APt^{4}	7R^{6}-4Pat^{4}			
					7,8,9	7RT^{6}-7T^{4}	7RT^{6}-7T^{4}			
RO-RY	Rock-Rumsley	6	7R^{6}-5RTp^{4}	7R^{6}-5RTp^{4}	5	7R^{6}-4APt^{4}	7R^{6}-4Pat^{4}			
					7,8,9	7RT^{6}-7T^{4}	7RT^{6}-7T^{4}			
RO-SL	Rock-Salalakim	6	7R^{6}-5RTp^{4}	7R^{6}-5RTp^{4}	5	7R^{6}-5Rap^{4}	7R^{6}-5Rap^{4}			
					7,8,9	7RT^{6}-7T^{4}	7RT^{6}-7T^{4}			
RO-ST	Rock-Saturna	6	7R^{6}-5RTp^{4}	7R^{6}-5RTp^{4}	4,5	7R^{6}-4APR^{4}	7R^{6}-4PRa^{4}			
					7,8,9	7RT^{6}-7T^{4}	7RT^{6}-7T^{4}			

Table 7. Land capability for agriculture (continued)

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
RY	Rumsley	6	5Tap^{8}-7R^{2}	5Tp^{8}-7R^{2}	4 5 7,8,9	4AP^{8}-7R^{2} 4APt^{8}-7R^{2} 7T^{8}-7RT^{2}	4Pa^{8}-7R^{2} 4Pat^{8}-7R^{2} 7T^{8}-7RT^{2}	RYsl	5RTp^{8}-7R^{2}	5RTp^{8}-7R^{2}
RY-ME	Rumsley-Mexicana	5	4APt^{6}-3APT^{4}	4Pat^{6}-3Tap^{4}	4 6 7	4AP^{6}-3APt^{4} 5Tap^{6}-5T^{4} 7T	4Pa^{6}-2APT^{4} 5Tp^{6}-5T^{4} 7T			
SL	Salalakim	7,8,9,10	7T^{8}-7RT^{2}	7T^{8}-7RT^{2}	5 6	5Rap^{8}-7R^{2} 5RTp^{8}-7R^{2}	5Rap^{8}-7R^{2} 5RTp^{8}-7R^{2}	SLsl	7T^{8}-7RT^{2}	7T^{8}-7RT^{2}
SL-ME	Salalakim-Mexicana	5	5Rap^{6}-4Pat^{4}	5Rap^{6}-4Pat^{4}	4 6 7,8	5Rap^{6}-3APt^{4} 5RTp^{6}-5T^{4} 7T	5Rap^{6}-2APT^{4} 5RTp^{6}-5T^{4} 7T			
SM	St. Mary	4	3Adt	2ADT-2DT	3 5 6	3Ad 3ATd 4Ta	2AD^{8}-2D^{2} 3Tad^{8}-3Td^{2} 4T	SMg	4AP^{8}-3Adt^{2}	3APd^{8}-2DT^{2}
SM-HA	St. Mary-Haslam	5	3ATd^{6}-4Pat^{4}	3Tad^{6}-4Pat^{4}	4 6	3Adt^{6}-4Pa^{4} 4Ta^{6}-5Tp	2ADT^{6}-4Pa^{4} 4T^{6}-5T			
SM-ME	St. Mary-Mexicana	5	3ATd^{6}-3APT^{4}	3Tad^{6}-3Tap^{4}	4 6 7	3Adt^{6}-3APt^{4} 4Ta-4Tap 7T	2ADT^{6}-2APT^{4} 4T 7T	SMg-ME	4APt^{6}-3APT^{4}	3APd^{6}-3Tap^{4}

Table 7. Land capability for agriculture (concluded)

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
ST	Saturna	6	5Tap^8-7R^2	5Tp^8-7R^2	4	4APt^8-7R^2	4Pat^8-7R^2	STsl	5RTp^8-7R^2	5RTp^8-7R^2
					5	4APT^8-7R^2	4PTa^8-7R^2	STl	5Tap^8-7R^2	5Tp^8-7R^2
					7,8,9	7T^8-7TR^2	7T^8-7TR^2	STd	4APt^8-7R^2	4Pat-7R^2
ST-ME	Saturna-Mexicana	6	5Tap^6-5T^4	5Tp^6-5T^4	3	4AP^6-3AP^4	4Pa^6-2AP^4			
					4	4AP^6-3APt^4	4Pa^6-2APT^4			
					5	4APt^6-3APT^4	4Pat^6-3Tap^4			
					7	7T	7T			
SU	Suffolk	3	3Ad^8-4W^2	2D^8-2DW^2	4	3Adt^8-4W^2	2DT^8-2DW^2	SUpd,a	4W	2DW
					5	3ATd^8-4W^2	3Td^8-2DW^2			
					6	4Ta-4W^2	4T-2DW^2			
TL	Tolmie	2,3	4W	2DW	4	4W	2TDW	TLp	5W	3DW
					5	4Wt	3Tdw	TLl	4W	2DRW
TR	Trincomali	5	4APt	4Pat	4	4AP	4Pa			
					6	4APT	4Tap			
					7	7T	7T			

*See map legend.

PART 6. DERIVED AND INTERPRETIVE MAPS

Besides the map unit interpretations discussed and presented in Part 5 of this report, similar or different interpretations that are more area (delineation)-specific could be made.

Agriculture Canada is able to produce maps based on the soil information. These may either be interpretive maps like the soil capability for agriculture or derived maps from the original soil information such as maps of texture, slope, or drainage. They can be made because the original boundaries and map unit symbols are stored in a computer as part of the Canada Soil Information System (CanSIS).

Soil maps are drafted by the Cartography Section in the Land Resource Research Centre of Agriculture Canada, Ottawa. As part of the cartographic procedure, the soil maps are digitized, that is, the locations of the map unit boundaries and their symbols are inputted into the computer and the soil map and associated legend and map unit symbols are then stored in the computer. This data base provides the basis for the production of derived or interpretive maps.

For example, it is possible that a map showing only the different types of soil parent materials is required. The procedure involves replacing the original map unit symbol by a new symbol that indicates the type of soil parent material. The same boundaries are retained, with the exception of those that have the same new symbols on either side. In this instance, the boundary is deleted. No new boundaries are added.

If users of the soil information need derived or interpretive maps, they should contact the senior author of this report at British Columbia Land Resource Unit, Agriculture Canada, 6660 N.W. Marine Drive, Vancouver, B.C., V6T 1X2 (Telephone (604)-224-4355).

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APPENDIX. PROFILE DESCRIPTIONS AND ANALYTICAL DATA OF THE SOILS

This appendix is an alphabetical listing of profile descriptions and accompanying analytical data for most of the soils on Saltspring Island. To best represent typical profiles for the soils mapped on Saltspring Island, selections have also been made from profiles described on adjoining Gulf Islands.

Standard methods of soil analyses (McKeague 1976) were followed in Agriculture Canada's soil survey laboratory in Vancouver. The relative soil erodibility (K-value) for each horizon was determined, using the methodology described by Wischmeier and Smith (1978).

BEDDIS SOIL

Location: woodlot south of North Road, 700 m east of Degnen Road, Gabriola Island
Landform: blanket of marine deposits
Topography: very gentle slopes (2%), slightly mounded microtopography
Parent materials: marine sand deposits
Present land use: woodlot dominated by western red cedar, red alder, and broadleaf maple
Remarks: profile is wetter than typical Beddis soil and is Podzolic rather than Brunisolic

Longitude: 123°44'25"W
Latitude: 49°09'25"N
Elevation: 40 m
Drainage: moderately well
Perviousness: rapidly
Effective rooting depth: 75 cm
Classification: Gleyed Humo-Ferric Podzol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
LF	4-0										
Ah	0-6	very dark brown (10YR 2/2)	dark brown (7.5YR 2/2)	sand	weak	fine	granular	loose	very friable	none	0
Bf1	6-15	dark brown (7.5YR 3/2)	brown, dark brown (7.5YR 4/4)	sand	weak	fine to medium	massive	soft	very friable	none	0
Bf2	15-50	dark brown (7.5YR 3/2)	yellowish brown (10YR 5/4	sand	weak	fine	massive	loose	very friable	none	0
Bf3	50-75	dark brown (7.5YR 3/2)	yellowish brown (10YR5/4)	sand	weak	fine	massive	loose	very friable	none	0
Bgj	75-90	strong brown (7.5YR 5/6)	strong brown (7.5YR 5/6)	sand	weak	fine	massive	soft	very friable	com.,medium,dist. yellowish red (5YR 4/6)	0
BCg	90-105	yellowish brown (10YR 5/6)	brownish yellow (10YR 6/6)	gravelly sand	weak	moderate to coarse	massive	hard	firm	com.,coarse,prom. yellowish red (5YR 4/6)	30

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
LF	4.7	30.6	1.1	28	0.1	0.2	0.3	0.2	80.3	26.6	4.3	0.8	0.2	40					
Ah	4.5	13.9	0.5	29	0.2	0.3	0.4	0.3	26.8	7.9	1.2	0.2	0.1	35	87	18	10	3	0.07
Bf1	4.8	1.9	0.1	18	0.2	0.3	0.5	0.6	10.5	2.8	0.3	0.1	0.01	31	91	17	7	2	0.15
Bf2	5.1	1.3	0.1	18	0.2	0.3	0.5	0.6	7.8	2.0	0.3	0.1	0.01	31	91	17	8	2	0.17
Bf3	5.1	1.1	0.1	21	0.1	0.3	0.5	0.6	6.2	1.3	0.2	0.1	0.01	26	90		8	2	0.18
Bgj	5.0	0.9	0.1	18			0.6	0.6	6.9	1.4	0.2	0.1	0.1	26	92		7	1	0.17
BCg	5.1	0.4	0.1	20			0.5	0.4	3.9	0.9	0.1	0.1	0.7	31	93		6	1	0.20

BELLHOUSE SOIL

Location: petroglyph site behind United Church, South Road, Gabriola Island
Landform: colluvial veneer overlying smooth, sandstone bedrock
Topography: nearly level (2%) within a moderate sloping (10-15%) area with smooth microtopography, southerly aspect
Parent materials: shallow channery sandy loam to channery sand colluvial materials over sandstone bedrock
Present land use: Garry oak and grasses with exposed sandstone bedrock, usually covered by moss, surrounded by coast Douglas fir
Remarks: organic iron cementation is atypical for Bellhouse soil

Longitude: 123°43'50"W
Latitude: 49°08'18"N
Elevation: 45 m
Drainage: well
Perviousness: rapidly
Effective rooting depth: 25 cm
Classification: Orthic Sombric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
H	3-0										
Ah1	0-10	black (10YR 2/1)	dark brown (7.5YR 3/2)	sandy loam	weak	fine	columnar	slightly hard	friable	none	15
Ah2	10-20	black (10YR 2/1)	dark brown (10YR 3/3)	channery sandy loam	very weak	medium	subangular blocky	soft	very friable	none	40
Bm	20-30	dark yellowish brown (10YR 4/4)	dark brown brown (7.5YR 4/4)	channery loamy sand	very weak	fine	granular	soft	friable	none	45
Bc	23-26	dark brown (10YR 3/3)	black (10YR 2/1)	sand	strong		massive	rigid	very firm	none	
R	26+										

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
H	4.9	18.0	1.3	14	0.3	0.6	0.6	0.6	47.4	13.8	2.8	0.6	0.4	37					
Ah1	4.6	12.1	0.8	15	0.3	0.8	0.6	0.8	31.6	2.8	0.6	0.1	0.1	12	64	8	27	9	0.15
Ah2	4.6	5.8	0.5	12	0.3	0.8	0.6	1.0	23.2	1.8	0.4	0.1	0.1	10	71	8	23	6	0.18
Bm	4.8	5.7	0.5	11	0.2	0.8	0.5	1.8	21.4	1.2	0.3	0.1	0.1	8	81		15	4	0.06
Bc	4.8	2.2	0.2	11	0.5	0.5	1.8	1.5	12.4	0.8	0.1	0.0	0.0	8	89		9	2	0.08
R																			

BRIGANTINE SOIL

Location: Morgan Road Dyer's farm, Galiano Island
Landform: blanket of marine deposits overlying subdued terrain
Topography: gentle slope (7%), moderately mounded microtopography
Parent materials: shallow sandy loam marine deposits overlying deep loam marine deposits
Present land use: forested, dominated by western red cedar and coast Douglas fir
Remarks: subsoil is usually finer textured

Longitude: 123°21'50"W
Latitude: 48°52'45"N
Elevation: 130 m
Drainage: imperfectly
Perviousness: moderately
Effective rooting depth: 67 cm
Classification: Gleyed Dystric Brunsiol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	moist	wet		
Ah	0-9	very dark brown (10YR 2/2)	dark brown (10YR 4/3)	sandy loam	weak	medium to coarse	granular	friable	nonsticky	none	< 10
Bm1	9-31	dark brown (7.5YR 3/4)	yellowish brown (10YR 5/4)	sandy loam	weak	fine to medium	subangular blocky	very friable	slightly sticky	none	< 10
Bm2	31-58	strong brown (7.5YR 4/6)	yellowish brown (10YR 5/4)	sandy loam	weak to moderate	fine to medium	subangular blocky	very friable	slightly sticky	none	< 10
Bm3	58-67	dark yellowish brown (10YR 4/6)	yellowish brown (10YR 5/4)	sandy loam	moderate	fine to medium	subangular blocky	friable	slightly sticky	none	< 10
IIBg1	67-76	olive (2.5Y 5/4)	pale yellow (2.5Y 7/4)	loam	moderate	medium to coarse	subangular blocky	friable	sticky	com.,fine,prom. strong brown (7.5YR 4/6)	< 5
IIBg2	76-96	olive (2.5Y 4/4)	very pale brown (10YR 7/4)	loam	moderate to strong	coarse	angular blocky	firm	sticky	many,medium,prom. strong brown (7.5YR 4/6)	< 5
IICBg	96-115	olive (2.5Y 4/4)	light yellowish brown (2.5Y 6/4)	loam	moderate to strong	coarse	angular blocky	firm	sticky	few,fine,prom. strong brown (7.5YR 5/6)	< 5

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution			Soil erosion K-value
					Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Silt (%)	Clay (%)	
Ah	4.9	4.6	0.2	22	0.3	0.3	21.2	6.8	1.2	0.7	0.1	42	59	30	12	0.14
Bm1	4.9	1.2	0.1	19	0.3	0.3	10.1	2.4	0.7	0.3	0.1	35	65	25	10	0.20
Bm2	4.8	0.9	0.1	16	0.3	0.3	9.8	2.3	0.7	0.2	0.1	34	63	26	11	0.23
Bm3	4.7	0.9	0.1	18	0.3	0.2	10.4	2.5	0.8	0.2	0.1	34	62	27	11	0.24
IIBg1	4.7	0.5	0.0	14	0.1	0.1	12.1	5.2	1.6	0.1	0.2	58	45	44	11	0.38
IIBg2	5.0	0.4	0.0	17			14.3	9.0	2.5	0.1	0.2	82	44	47	9	0.43
IICBg	5.9						15.0	10.6	2.7	0.1	0.3	91	45	44	10	0.40

COWICHAN SOIL

Location: field behind old Mission School, Kuper Island
Landform: blanket of marine deposits; drumlinized, rolling terrain
Topography: very gentle slopes (2-5%), smooth microtopography
Parent materials: silty clay marine deposits
Present land use: pasture
Remarks: typical Cowichan soil profile

Longitude: 123°39'10"W
Latitude: 48°58'25"N
Elevation: 10m
Drainage: poorly
Perviousness: slowly
Effective rooting depth: 24 cm
Classification: Humic Luvic Gleysol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	moist	wet		
Ap	0-24	dark brown (7.5YR 3/2)	brown (10YR 5/3)	silt loam	strong	coarse	granular	friable	nonsticky	none	0
Aeg1	24-33	gray, light gray (5Y 6/1)	light gray (10YR 7/2)	silt loam	moderate to strong	medium	subangular blocky	friable	slightly sticky	many,fine,prom. yellowish brown (10YR 5/6)	2
Aeg2	33-40	gray, light gray (5Y 6/1)	white (10YR 8/1)	silt loam to loam	moderate to strong	medium to coarse	subangular blocky	firm	sticky	com.,fine,prom. yellowish brown (10YR 5/6)	5
Btg1	40-53	gray (5Y 5/1)	pale brown (10YR 6/3)	silty clay	moderate	coarse	angular blocky	firm	sticky	many,medium,prom. yellowish brown (10YR 5/6)	0
Btg2	53-70	gray (5Y 5/1)	pale brown (10YR 6/3)	silty clay			massive	firm	sticky	many,medium,prom. strong brown (7.5YR 5/6)	0
BCg	70-90+	olive gray (5Y 4/2)	light gray (2.5Y 7/2)	silty clay	weak	fine	pseudo-platy	firm	sticky	none	

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
Ap	4.9	3.3	0.2	14	0.4	0.3	0.9	0.4	21.4	5.5	2.1	0.6	0.1	39	17	7	58	25	0.33
Aeg1	4.8	0.5	0.0	15	0.2	0.1	0.5	0.2	8.1	2.7	1.5	0.1	0.1	55	22	11	60	19	0.58
Aeg2	4.8	0.5	0.0	14	0.2	0.1	0.4	0.2	8.3	2.8	1.8	0.1	0.1	58	29		51	19	0.46
Btg1	5.0				0.1	0.1	0.8	0.3	26.5	10.0	9.9	0.2	0.3	76	6		43	50	0.27
Btg2	5.4				0.1	0.1	0.5	0.2	30.3	14.2	13.6	0.2	0.4	93	5		46	48	0.29
BCg	5.8				0.1	0.1	0.5	0.3	29.9	15.1	13.8	0.2	0.4	100+	1		48	51	0.31

CROFTON SOIL

Location: end of Horton Bay Road to south in little depression, Mayne Island
Landform: fluvial blanket, depression
Topography: very gentle slopes (2%), slightly mounded microtopography
Parent materials: variable textured fluvial deposits
Present land use: permanent pasture dominated by horsetail and Juncus
Remarks: textures much coarser than typical Crofton soil; no B-horizon present

Longitude: 123°14'30"W
Latitude: 48°49'20"N
Elevation: 10 m
Drainage: very poorly
Perviousness: moderate
Effective rooting depth: 30 cm
Classification: Rego Humic Gleysol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	moist	wet		
Ap1	0-6	very dark grayish brown (10YR 3/2)	dark grayish brown (10YR 4/2)	loam to clay loam			massive	friable	nonsticky	none	7
Ap2	6-30	very dark brown (10YR 2/2)	dark grayish brown (10YR 4/2)	gravelly sandy loam			massive	friable	slightly sticky	none	26
Ah	30-44	black (10YR 2/1)	dark grayish brown (10YR 4/2)	gravelly sandy loam	moderate	coarse	subangular blocky	firm	sticky	com.,fine,prom. yellowish red (5YR 4/6)	26
Cg	44-125	olive gray (5Y 4/2)	light brownish gray (10YR 6/2)	very gravelly sandy loam			single grain	loose	nonsticky	none	51

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Cation exchange					Base sat. (%)	Particle size distribution				Soil erosion K-value
					CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
					(meq/100 g soil)										
Ap1	5.1	11.0	0.8	14	42.3	14.8	4.8	0.7	1.2	51	36	12	38	27	0.24
Ap2	5.0	3.0	0.2	14	18.5	6.8	2.1	0.1	0.3	50	60	7	27	13	0.19
Ah	4.8	2.9	0.2	13	19.1	6.2	2.0	0.1	0.3	45	61		23	16	0.15
Cg	4.8	0.5	0.0	12	10.3	3.9	1.8	0.1	0.3	58	71		23	6	0.15

FAIRBRIDGE SOIL

Location: Green Acres resort area, Land Road, Saltspring Island
Landform: blanket of marine deposits, level terrain
Topography: very gently slopes (4%) with a northeasterly aspect
Parent materials: silty clay loam to silty clay marine deposits
Present land use: abandoned pasture, with Scotch broom and plantain
Remarks: profile has eluviated horizon (Ae) and contrasting particle sizes

Longitude: 123°32'3"W
Latitude: 48°54'13"N
Elevation: 40 m
Drainage: imperfectly
Perviousness: slowly
Effective rooting depth: 25 cm
Classification: Gleyed Eluviated Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
Ap	0-7	very dark grayish brown (10YR 3/2)	dark brown (10YR 3/3)	loam	strong	medium	platy	slightly hard	friable	none	0
Bm	7-12	dark brown (10YR 4/3)	yellowish brown (10YR 5/4)	loam	moderate	medium	subangular blocky	hard	friable	none	0
Ae	12-25	light olive brown (2.5Y 5/4)	very pale brown (10YR 7/3)	loam	moderate	medium	subangular blocky	hard	firm	few,fine,faint	0
IIBg1	25-46	olive gray (5Y 5/2)	light gray (10YR 7/2)	silty clay loam	strong	medium to coarse	angular blocky	very hard	firm	many,medium,prom. reddish gray (5YR 5/2)	0
IIBg2	46-95	gray (5Y 5/1)	gray (10YR 6/1)	silty clay	moderate	medium	angular blocky	extreme hard	firm	many,fine,prom. yellowish red (5YR 5/6-5/8)	0
IICg1	95+	grayish brown (2.5Y 5/2)	gray (10YR 6/1)	silty clay	strong	medium	angular blocky	rigid	firm	many,fine,prom. strong brown (7.5YR 5/6)	0

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
Ap	4.5	5.5	0.3	19			21.1	7.3	1.3	0.3	0.2	43	41	12	44	15	0.40
Bm	4.5	2.1	0.1	21	0.3	0.2	15.1	4.2	0.9	0.1	0.1	35	40	11	42	18	0.37
Ae	4.7	0.9	0.1	18	0.2	0.1	11.0	3.9	1.0	0.2	0.1	47	43	15	43	14	0.57
IIBg1	4.9	0.6	0.0	15			20.6	11.7	4.8	0.3	0.2	82	20		44	37	0.32
IIBg2	5.4	0.4	0.0	11			30.7	20.5	8.9	0.2	0.5	98	6		49	45	0.34
IICg1	5.8	0.4	0.0	14			27.3	19.0	8.0	0.2	0.5	100+	2		54	43	0.35

GALIANO SOIL

Location: Yardarm Road, Magic Lake Estates, North Pender Island
Landform: colluvial veneer overlying shale bedrock
Topography: strongly sloping (25%) with a northerly aspect
Parent materials: shallow very shaly silt loam colluvial materials overlying shale bedrock
Present land use: residential subdivision
Remarks: Bfj horizon is normally a Bm horizon

Longitude: 123°18'7"W
Latitude: 48°46'30"N
Elevation: 85 m
Drainage: well
Perviousness: rapidly
Effective rooting depth: 40 cm
Classification: Orthic Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
Ah	0-9	very dark brown (10YR 2/2)	dark grayish brown (10YR 4/2)	very shaly silt loam	weak	fine	granular	soft	very friable	none	65
Bfj	9-40	very dark grayish brown (10YR 3/2)	dark brown (10YR 4/3)	very shaly silt loam	moderate	coarse	angular blocky	slightly hard	friable	none	65
C	40-55	dark brown (10YR 4/3)	brown (10YR 5/3)	very shaly silt loam	strong	coarse	angular blocky	hard	firm	none	85
R	55+										

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Cation exchange					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
								(meq/100 g soil)									
Ah	4.9	7.1	0.3	21			23.2	16.5	2.4	1.1	0.2	87	33	7	54	14	0.30
Bfj	4.8	2.0	0.1	17	0.4	0.4	11.3	8.8	1.9	0.5	0.3	100+	30	7	56	14	0.33
C	4.7	1.5	0.1	15			19.5	10.8	2.5	0.7	0.3	73	25		61	14	0.34

METCHOSIN SOIL

Location: Henshaw Farm, South Pender Island
Landform: fen
Topography: level, 1% slope with smooth microtopography
Parent materials: peat (organic deposits) consisting of sedges and reeds with <10% woody materials
Present land use: pasture with grasses, sedges, and rushes
Remarks: water table at 105 cm (82/09/23)

Longitude: 123°13'00"W
Latitude: 48°44'56"N
Elevation: 70 m
Drainage: very poorly
Perviousness: moderately
Effective rooting depth: 35 cm
Classification: Typic Humisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Von post scale	Rubbed fibre (%)	Mottles	Coarse fragments (%)
		moist	dry					
Op	0-20	black (10YR 2/1)	black (10YR 2/1)	humic	06	2	none	0
Oh1	20-27	very dark brown (10YR 2/2)	black (10YR 2/1)	humic	08	2	none	0
Oh2	27-35	very dark brown (10YR 2/2)	black (10YR 2/1)	humic	07	2	none	0
Oh3	35-40	very dark brown (10YR 2/2)	black (10YR 2/1)	humic	08	2	none	0
Oh4	40-80	black (10YR 2/1)	very dark brown (10YR 2/2)	humic	08	4	none	0
Oh5	80-160	black (10YR 2/1)	very dark brown (10YR 2/2)	humic	09	2	none	0
Oh6	160-200+	black (10YR 2/1)	very dark brown (10YR 2/2)	humic	10	4	none	0

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Cation exchange					Base sat. (%)	Pyrophosphate index
					CEC	Ca	Mg	K	Na		
					(meq/100 g soil)						
Op	5.2	49.2	1.9	26	192.3	103.1	21.7	0.2	4.9	68	1
OH1	4.9	51.9	1.9	28	217.9	106.5	25.3	0.1	5.2	63	1
Oh2	5.0	51.5	2.2	24	184.0	83.0	19.5	0.1	5.2	59	1
Oh3	5.0	51.9	2.3	23	197.2	90.4	24.2	0.1	5.6	61	1
Oh4	5.1	52.6	1.5	36	208.1	95.7	29.6	0.1	7.6	64	3
Oh5	5.1	51.8	1.6	32	196.5	93.8	29.1	0.1	8.4	67	4
Oh6	5.3	52.5	1.6	32	177.9	85.9	30.7	0.1	8.4	70	4

MEXICANA SOIL

Location: Mowat's Estates, 100 m from end of Broadwell Drive, Saltspring Island
Landform: morainal blanket
Topography: strongly sloping (25%) with southerly to southwesterly aspect
Parent materials: sandy loam to loam morainal materials
Present land use: coast Douglas fir, Pacific madrone, ocean spray, and grasses
Remarks: profile is wetter and has thicker Ap horizon than typical Mexicana soil (Orthic Dystric Brunisol), and has a Bt horizon

Longitude: 123°33'12"W
Latitude: 48°54'5"N
Elevation: 120 m
Drainage: imperfectly
Perviousness: moderately
Effective rooting depth: 30 cm
Classification: Gleyed Gray Luvisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
Ap	0-12	very dark grayish brown (10YR 3/2)	dark brown (10YR 3/3)	sandy loam	weak to moderate	fine	subangular blocky	friable	slightly plastic	none	3
AB	12-30	dark brown (10YR 3/3)	dark brown (10YR 4/3)	sandy loam	moderate	coarse	subangular blocky	friable	slightly plastic	few,fine,faint dark brown (10YR 3/3)	5
Bxj	30-55	light olive brown (2.5Y 5/4)	very pale brown (10YR 7/3)	sandy loam	strong	very coarse	subangular blocky	firm	plastic	few,fine,faint yellowish brown (10YR 5/8)	5
Btg	55-95	pale brown (10YR 6/3)	light gray (10YR 7/2)	loam	moderate to strong	coarse	subangular blocky	firm	very plastic	many,coarse,prom. yellowish red (5YR 5/8)	5
BCg	95-120	light olive brown (2.5Y 5/6)	light gray (10YR 7/2)	sandy loam	strong	coarse	subangular blocky	firm	very plastic	many,medium,prom. yellowish red (5YR 3/8)	7
Cg	120-150+	light olive brown (2.5Y 5/4)	very pale brown(10YR 7/3)	sandy loam	strong	very coarse	pseudo-platy	very firm	very plastic	many,medium,prom. yellowish red (5YR 5/8)	10

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
Ap	5.8	4.2	0.1	33	0.2	0.2	0.4	0.4	18.4	9.9	2.2	1.5	0.1	75	57	13	34	9	0.31
AB	5.7	2.2	0.1	25	0.3	0.2	0.4	0.4	15.0	7.1	1.9	1.1	0.1	67	58	13	33	10	0.31
Bxj	5.6	0.4	0.0	19	0.1	0.1	0.3	0.2	9.7	5.0	2.0	0.2	0.1	74	59		33	8	0.30
Btg	5.4				0.4	0.2			14.1	7.6	2.8	0.1	0.1	76	49		38	13	0.34
BCg	5.2				0.3	0.2			12.0	7.2	2.2	0.1	0.2	80	57		35	8	0.33
Cg	5.3				0.3	0.2			10.0	6.7	1.9	0.0	0.2	88	62		32	6	0.29

MUSGRAVE SOIL

Location:	Musgrave Road, near Mt. Tuam schist pit, Saltspring Island
Landform:	colluvial blanket overlying metamorphosed sedimentary bedrock
Topography:	very strongly sloping (40%), microtopography is moderately mounded
Parent materials:	gravelly to very gravelly colluvial blanket overlying metamorphosed sedimentary bedrock
Present land use:	forested, coast Douglas fir, Pacific madrone, salal, Oregon grape, and northern twinflower
Remarks:	Bm2 tongues into Bm3, C3 is compacted, profile deeper than usual

Longitude:	123°30'36"W
Latitude:	48°44'36"N
Elevation:	415 m
Drainage:	well
Perviousness:	rapidly
Effective rooting depth:	90 cm
Classification:	Orthic Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence	Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	moist		
LF	1–0									
Ah	0–2	very dark brown (10YR 2/2)	dark brown (10YR 4/3)		weak	fine	granular	very friable	none	5
Bm1	2–25	dark reddish brown (5YR 3/2.5)	strong brown (7.5YR 5/6)	gravelly sandy loam	very weak	fine to very fine	granular	very friable	none	30
Bm2	25–40	reddish brown (5YR 4/4)	brown (7.5YR 5/4)	very gravelly sandy loam	weak	fine	subangular blocky	very friable	none	50
Bm3	40–50	dark yellowish brown (10YR 4/4)	very pale brown(10YR 7/4)	very gravelly sandy loam	weak	fine	subangular blocky	very friable	none	50
C1	50–80	olive brown (2.5Y 4/4)	light gray (2.5Y 7/2)	very gravelly sandy loam	weak	fine	angular blocky	very firm	none	60
C2	80–90	olive brown (2.5Y 4/4)	light gray (2.5Y 7/2)	very gravelly sandy loam	weak	fine	angular blocky	very firm	none	60
C3	90–120+	olive brown (2.5Y 4/4)	light gray (2.5Y 7/2)	very gravelly sandy loam				very firm	none	60

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution			Soil erosion K-value
					Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Silt (%)	Clay (%)	
LF	5.5	31.3	1.0	31	0.3	0.2										
Ah	5.6	8.0	0.3	27	0.2	0.3	34.6	20.0	1.8	0.9	0.1	66	48	42	11	0.12
Bm1	4.8	1.6	0.1	22	0.1	0.3	9.9	1.8	0.2	0.3	0.0	24	58	35	7	0.10
Bm2	4.9	2.0	0.1	30	0.1	0.1	8.9	6.2	0.2	0.1	0.0	72	61	35	4	0.29
Bm3	5.0	0.5	0.0	18	0.1	0.1	3.7	3.2	0.1	0.1	0.1	94	60	36	4	0.28
C1	5.2	0.2	0.0	6			3.4	5.1	0.2	0.0	0.1	100+	62	34	5	0.29
C2	5.2	0.2	0.0	24			4.2	14.2	0.2	0.0	0.2	100+	51	44	5	0.38
C3	5.6	0.1	0.0	20			4.2	15.5	0.1	0.0	0.2	100+	57	39	5	0.34

PARKSVILLE SOIL

Location: east of "hairpin turn" Bedwell Harbour Road, North Pender Island
Landform: blanket of marine deposits overlying level terrain
Topography: level (2% slope), with smooth microtopography
Parent materials: sandy loam marine deposits overlying silty clay loam marine deposits
Present land use: pasture, Juncus and grasses
Remarks: sand lens present in IIBCg, Ap horizon much finer textured than typical Parksville soil

Longitude: 123°16'31"W
Latitude: 48°47'5"N
Elevation: 50 m
Drainage: poorly
Perviousness: slowly
Effective rooting depth: 20 cm
Classification: Orthic Humic Gleysol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
Ap	0–20	very dark brown (10YR 2/2)	dark brown (10YR 3/3)	clay loam	strong	coarse	angular blocky	hard	friable	none	< 5%
Bg	20–50	olive brown (2.5Y 4/4)	pale brown (10YR 6/3)	sandy loam	moderate	very coarse	angular blocky	slightly hard	very friable	com.,fine,prom. dark yellowish brown (10YR 4/6)	< 5%
BCg	50–70	grayish brown (2.5Y 5/2)	light yellowish brown (2.5Y 6/4)	loam to sandy loam	strong	very coarse	angular blocky	hard	very friable	com.,medium,prom. strong brown (7.5YR 5/6)	< 5%
IICg	70–100+	olive brown (5Y 5/2)	light browish gray (2.5Y 6.5/2)	silty clay loam			massive	very hard	firm	com.,fine,prom. yellowish brown (10YR 5/6)	< 5%

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Oxalate		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
Ap	5.3	3.9	0.3	14	1.0	0.5	32.2	18.4	4.1	0.4	0.2	70	36	8	36	28	0.28
Bg	5.3	0.3	0.0	9	0.3	0.2	11.4	7.7	2.3	0.1	0.1	89	61		30	10	0.32
BCg	5.6	0.3	0.0	11	0.4	0.2	18.5	12.7	4.2	0.1	0.2	93	50		32	18	0.30
IICg	5.9	0.2	0.0	10	0.5	0.3	25.1	18.3	6.7	0.2	0.3	100+	12		55	33	0.42

QUALICUM SOIL

Location: Southwest of Ganges on north side of Fulford-Ganges Road, Saltspring Island
Landform: glaciofluvial blanket
Topography: strongly sloping (20%), moderately mounded microtopography
Parent materials: gravelly sandy to gravelly sandy loam glacialfluvial deposits
Present land use: forested, bigleaf maple, red alder, western red cedar, and western sword fern
Remarks: typical Qualicum profile

Longitude: 123°29'14"W
Latitude: 48°50'16"N
Elevation: 100 m
Drainage: well
Perviousness: rapidly
Effective rooting depth: 45 cm
Classification: Orthic Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
Lf	3-0										
Ah	0-9	very dark grayish brown (10YR 3/2)	dark brown (10YR 3/3)	very gravelly sandy loam	moderate	medium	granular	loose	friable	none	56
Bm1	9-45	olive brown (2.5Y 4/4)	yellowish brown (10YR 5/4)	gravelly loamy sand	very weak	medium	subangular blocky	soft	very friable	none	30
Bm2	45-65	olive brown (2.5Y 4/4)	light yellowish brown (2.5Y 6/4)	gravelly sand	moderate	medium	subangular blocky	slightly hard	friable	none	29
BC	65-100+	light olive brown (2.5Y 5/4)	pale yellow (2.5Y 7/4)	gravelly sandy loam	very weak	medium	angular blocky	slightly hard	friable	none	43

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange					Base sat. (%)	Particle size distribution			Soil erosion K-value
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Silt (%)	Clay (%)	
										(meq/100 g soil)								
Ah	5.3	10.9	0.5	24	0.2	0.2			35.4	16.2	2.3	0.4	0.1	53	75	19	6	0.05
Bm1	5.3	1.0	0.1	21	0.2	0.3	0.5	0.6	8.4	2.5	0.3	0.1	0.0	35	83	15	2	0.11
Bm2	5.6	0.3	0.0	23	0.0	0.1	0.3	0.4	3.6	1.0	0.1	0.1	0.0	33	88	10	2	0.09
BC	5.0								4.8	1.3	0.2	0.1	0.0	35	72	23	5	0.20

RUMSLEY SOIL

Location: Northwest of Lake Maxwell, under power line, Saltspring Island
Landform: colluvial veneer-blanket in rolling landscape
Topography: gently sloping (8%)
Parent materials: gravelly sandy loam colluvial materials overlying metamorphosed igneous bedrock
Present land use: forested, coast Douglas fir, and salal
Remarks: C-horizon consists dominantly of fractured bedrock, Bf horizon is atypical

Longitude: 123°33'5"W
Latitude: 48°49"34'N
Elevation: 420 m
Drainage: well
Perviousness: rapidly
Effective rooting depth: 95 cm
Classification: Orthic Humo-Ferric Podzol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
LFH	7-0										
Bf	0-30	dark brown (7.5YR 3/4)	strong brown (7.5YR 5/6)	sandy loam	weak	fine	subangular blocky	soft	very friable	none	20
Bm	30-65	dark yellowish brown(10YR 3/6)	light yellowish brown(10YR 6/4)	gravelly sandy loam	weak	fine	subangular blocky	soft	friable	none	25
Bc	65-95	light olive brown(2.5Y 5/6)	light yellowish brown(2.5Y 6/4)	gravelly sandy loam	weak to moderate	medium	subangular blocky	soft	very friable	none	30
C(R)	95-100	light olive brown(2.5Y 5/6)	light yellowish brown(2.5Y 6/4)	very gravelly sandy loam						none	98
R	100+										

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Cation exchange					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
							(meq/100 g soil)										
LFH	4.9	17.8	0.5	36													
Bf	5.1	1.8	0.1	19	0.2	0.5	11	2.4	0.2	0.1	0.1	24	52	9	43	5	0.34
Bm	4.9	1.2	0.1	18	0.1	0.4	9	1.2	0.2	0.1	0.0	17	52		43	5	0.30
BC	4.7	0.9	0.1	16	0.1	0.4	8	0.5	0.1	0.1	0.1	9	54		42	4	0.30
C(R)	4.6	1.2	0.0	29			7	0.7	0.2	0.1	0.1	14	54		41	5	

SALALAKIM SOIL

Location: Gowlland Point Road, South Pender Island
Landform: colluvial blanket, ridged terrain
Topography: extremely sloping (65%), with southerly aspect, slightly mounded microtopography
Parent materials: gravelly loam colluvial materials over conglomerate bedrock
Present land use: forested, coast Douglas fir, Pacific madrone, grasses, hairy honeysuckle, and common gorse
Remarks: profile deeper (> 100 cm) and finer textured than Salalakim soil

Longitude: 123°12'43"W
Latitude: 48°44'26"N
Elevation: 55 m
Drainage: well
Perviousness: moderately
Effective rooting depth: 78 cm
Classification: Orthic Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
Ah	0–4	dark brown (7.5YR 3/2)	dark brown (7.5YR 4/2)	gravelly loam	moderate to strong	fine	granular	hard	friable	none	35
Bm1	4–33	dark brown (7.5YR 3/2)	dark brown (7.5YR 4/2)	gravelly loam to sandy loam	moderate	very fine	subangular blocky	hard	friable	none	35
Bm2	33–78	dark brown (7.5YR 4/2)	dark brown (7.5YR 4/2)	gravelly loam to sandy loam	moderate	very fine	subangular blocky	hard	friable	none	40
BC	78–120	dark brown (7.5YR 3/2)	brown (7.5YR 5/2)	gravelly loam to sandy loam	weak to moderate	fine	subangular blocky	hard	friable	none	30

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
Ah	5.9	3.9	0.3	15	0.1	0.0	23.2	12.8	6.1	1.2	0.1	83	47	13	37	16	0.24
Bm1	5.3	1.0	0.1	17	0.1	0.1	21.6	10.5	6.7	0.4	0.1	82	52	14	33	15	0.39
Bm2	5.5	1.9	0.1	20	0.1	0.1	21.9	11.4	4.4	0.1	0.1	75	52		35	13	0.20
BC	5.7	1.0	0.1	16	0.1	0.1	17.8	10.7	4.0	0.1	0.1	86	51		38	11	0.30

SATURNA SOIL

Location: south arm of Hess Road, 100 m before dead end, 10 m east in trees, Gabriola Island
Landform: colluvial veneer over sandstone bedrock, rolling landscape
Topography: moderate to strong slopes (15%) southerly aspect, slightly mounded microtopography
Parent materials: sandy loam colluvial materials over sandstone bedrock
Present land use: forested, coast Douglas fir, and salal
Remarks: Ah deeper and textures finer than typical Saturna soil

Longitude: 49°09'20"W
Latitude: 123°47'30"N
Elevation: 140 m
Drainage: well
Perviousness: rapidly
Effective rooting depth: 60 cm
Classification: Orthic Sombric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
LF	3-0										
Ah	0-11	very dark grayish brown(10YR 3/2)	brown to dark brown(7.5YR 4/2)	channery loam	strong	coarse	granular	slightly hard	friable	none	20
Bm1	11-30	brown,dark brown (10YR 4/3)	dark brown (7.5YR 3/2)	channery loam to sandy loam	strong	medium	angular blocky	slightly hard	friable	none	25
Bm2	30-50	brown,dark brown (10YR 4/3)	brown, dark brown(7.5YR 4/4)	very channery sandy loam	moderate	medium	angular blocky	slightly hard	friable	none	60
CB	50-80	yellowish brown (10YR 5/4)	brown, dark brown(7.5YR 4/4)	very channery sandy loam	weak	very fine	angular blocky	slightly hard	friable	none	90
R	80+										

ANALYTICAL DATA

Horizon	pH in CaCl$_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
									(meq/100 g soil)										
LF	4.9	36.2	1.3	28	0.0	0.1	0.2	0.2	88.8	32.7	7.8	3.4	0.4	50					
Ah	4.7	7.1	0.4	19	0.2	0.2	0.4	0.3	32.0	11.5	2.7	0.6	0.1	47	48	10	42	10	0.24
Bm1	4.9	1.5	0.1	16	0.2	0.2	0.4	0.3	19.0	7.0	1.7	0.5	0.1	49	52	11	38	10	0.30
Bm2	4.8	1.3	0.1	17	0.2	0.2	0.5	0.5	17.1	5.3	1.3	0.5	0.1	42	55		34	11	0.24
CB	4.8				0.1	0.1	0.5	0.3							53		40	7	0.28

ST. MARY SOIL

Location: field north of South Road near Cooper Road junction, Gabriola Island
Landform: marine veneer overlying glacial till blanket
Topography: gentle slopes (7%), slightly mounded microtopography
Parent materials: shallow sandy loam marine deposits over shallow loam marine deposits over loam glacial till materials
Present land use: hay field
Remarks: texture of subsoil (loam) is lighter and Ah horizon deeper than typical St. Mary soil

Longitude: 123°43'35"W
Latitude: 49°08'15"N
Elevation: 30 m
Drainage: imperfectly
Perviousness: moderately
Effective rooting depth: 50 cm
Classification: Gleyed Sombric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
Ap1	0-16	black (10YR 2/1)	very dark brown (10YR 2/2)	sandy loam	weak	medium	granular	soft	very friable	none	17
Ap2	16-35	black (10YR 2/1)	very dark grayish brown (10YR 3/2)	sandy loam	weak	fine	granular	soft	very friable	none	13
Bgj1	35-45	light olive brown (2.5Y 5/4)	light yellowish brown (10YR 3/2)	loam	moderate	medium	angular blocky	hard	friable	com.,fine,dist. yellowish brown (10YR 5/6)	< 5
Bgj2	45-65	light olive brown (2.5Y 5/4)	olive yellow (2.5Y 6/6)	loam			massive	very hard	firm	com.,fine,dist. yellowish brown (10YR 5/6)	< 5
IICg	65-75+	gray to light gray (5Y 6/1)	light brownish gray (2.5Y 6/2)	loam	moderate to strong	fine to medium	pseudo-platy	very hard	firm	com.,fine,prom. yellowish red (5YR 4/6)	

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
Ap1	5.3	5.0	0.4	14	0.4	0.5	0.7	0.5	24.6	8.0	1.1	0.1	0.1	38	63	7	26	11	0.17
Ap2	5.4	4.2	0.2	18	0.5	0.4	0.7	0.5	20.4	7.5	1.4	0.0	0.1	44	60	8	27	12	0.14
Bgj1	5.7	0.5	0.1	11	0.1	0.1	0.3	0.1	12.3	6.1	1.7	0.0	0.1	65	48		36	16	0.27
Bgj2	5.8	0.5	0.0	12	0.1	0.1	0.3	0.1	13.8	7.7	2.3	0.1	0.2	74	44		41	15	0.29
IICg	6.1						0.3	0.1	10.8	6.6	1.9	0.1	0.1	80	48		41	10	0.34

SUFFOLK SOIL

Location: 300 m on logging road northwest of Hunter Farm boundary, 7 m upslope, Thetis Island
Landform: marine veneer overlying glacial till blanket, rolling landscape
Topography: moderate slopes (15%), smooth microtopography
Parent materials: shallow loam to silty clay loam marine deposits overlying sandy loam glacial till deposits
Present land use: forested, coast Douglas fir, Pacific madrone, salal, and Oregon grape
Remarks: much higher CF percentage in surface horizons than typical Suffolk soil

Longitude: 123°41'35"W
Latitude: 48°59'55"N
Elevation: 20 m
Drainage: imperfectly
Perviousness: slowly
Effective rooting depth: 60 cm
Classification: Gleyed Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	moist	wet		
LFH	5-0										
Ah	0-10	very dark brown (7.5YR 2.53)	brown (10YR 5/3)	gravelly loam	moderate to strong	medium	granular	friable	nonsticky	none	40
Bm1	10-28	dark yellowish brown(10YR 3/4)	pale brown (10YR 6/3)	gravelly loam	moderate	medium	subangular blocky	friable	nonsticky	none	35
Bm2	28-40	dark yellowish brown (10YR 4/4)	pale yellow (2.5Y 7/4)	silt loam	weak to moderate	medium	subangular blocky	friable	nonsticky	none	10
Bm3	40-55	dark yellowish brown (10YR 4/4)	pale yellow (2.5Y 7/4)	silt loam to silty clay loam	moderate	medium	subangular blocky	firm	sticky	none	0
BCg	55-73	dark yellowish brown (10YR 4/4)	pale brown (2.5Y 7/4)	silty clay loam	moderate	medium	pseudo-platy	firm	sticky	many,medium,prom. dark brown (5YR 4/4)	0
Cg	73-100	grayish brown (2.5Y 5/2)	light gray (2.5Y 7/2)	silt loam	strong	medium to coarse	pseudo-platy	very firm	slightly sticky	many,medium,prom. dark brown (5YR 4/4)	0
IICg	100-106+	olive brown (2.5Y 4/4)	pale yellow (2.5Y 7/4)	gravelly sandy loam			massive	friable	nonsticky	many,medium,prom. yellowish brown (10YR 5/6)	20

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
LFH	5.4				0.1	0.2	0.4	0.3	75.9	51.1	7.1	1.8	0.1	79					
Ah	5.4	5.7	0.2	24	0.3	0.3	0.7	0.5	33.1	14.6	2.5	1.0	0.1	55	41	9	42	17	0.30
Bm1	5.4	1.6	0.1	17	0.3	0.3	0.6	0.6	17.7	5.8	1.3	0.7	0.1	45	46	7	36	18	0.32
Bm2	4.7				0.2	0.2	0.8	0.5	22.0	5.9	2.5	0.3	0.2	40	23		52	25	0.42
Bm3	4.5				0.2	0.2	1.0	0.5	28.5	6.9	3.3	0.3	0.2	37	19		54	27	0.44
BCg	4.4				0.2	0.2	1.1	0.5	25.0	6.1	2.8	0.2	0.2	37	13		57	30	0.44
Cg	4.1				0.1	0.2	0.8	0.4	21.9	4.7	2.0	0.1	0.2	32	19		61	20	0.53
IICg	4.4				0.1	0.1	0.6	0.4	12.2	2.1	0.8	0.1	0.1	25	56		37	7	0.40

TOLMIE SOIL

Location: Port Washington Road, North Pender Island
Landform: marine blanket
Topography: nearly level (1%) slope
Parent materials: fine marine blanket, sandy marine horizons
Present land use: forested, red alder, rose, and blackberry
Remarks: watertable at 105 cm on 14 May 1982. Ae horizon not typical for Tolmie soil

Longitude: 123°17'55"W
Latitude: 48°48'29"N
Elevation: 30 m
Drainage: poorly
Perviousness: slowly
Effective rooting depth: 45 cm
Classification: Orthic Humic Gleysol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	dry	moist		
LF	1-0										
Ah	0-15	black (10YR 2/1)	grayish brown (10YR 5/2)	silty clay loam	strong	coarse	granular	slightly hard	friable	none	< 5
Aegj	15-28	grayish brown (2.5Y 5/2)	light gray (10YR 7/1)	silt loam	weak to moderate	fine	platy	slightly hard	friable	few, faint	< 5
IIBg	28-38	gray (5Y 5/1)	light gray (10YR 7/2)	loamy sand			single grain	loose	loose	many,fine,prom. yellowish brown (10YR 5/6)	< 5
IIIBg	38-85	gray (5Y 5/1)	light brownish gray (2.5Y 6/2)	clay loam	weak to moderate	fine	angular blocky	hard	firm	many,fine,prom. yellowish brown (10YR 5/6)	< 2
IIICg	85-105+	dark gray (5Y 4/1)	light brownish gray (2.5Y 6/2)	silty clay loam	moderate to strong	fine to medium	angular blocky	hard	firm	com.,fine,prom. dark yellowish brown (10YR 4/6)	< 2

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
Ah	4.1	7.4	0.8	10	0.2	0.2	0.3	0.2	33.5	10.6	2.4	0.1	0.3	38	16	6	51	33	0.27
Aegj	5.1	0.6	0.1	10	0.0	0.1	0.1	0.1	12.7	7.8	2.5	0.0	0.2	83	20		58	22	0.46
IIBg	5.1	0.2	0.0	8	0.0	0.0	0.1	0.0	4.7	3.2	1.0	0.0	0.1	91	76		21	4	0.21
IIIBg	6.3	0.2	0.0	10	0.1	0.01	0.2	0.1	26.4	19.1	8.7	0.2	0.3	100+	30		39	31	0.33
IIICg	6.5	0.4	0.0	15					27.4	20.2	8.5	0.2	0.3	100+	14		47	39	0.31

TRINCOMALI SOIL

Location: northwest of Welbury Bay, west of Long Harbour, Saltspring Island
Landform: marine veneer overlying compact glacial till
Topography: very gently sloping (3%) with a southwesterly aspect
Parent materials: shallow sandy loam to loamy sand marine deposits overlying loam to silt loam morainal materials
Present land use: forested, coast Douglas fir, grand fir, salal, and Oregon grape
Remarks: wetter than typical Trincomali soil (Orthic Dystric Brunisol)

Longitude: 123°27'7"W
Latitude: 48°51'16"N
Elevation: 90 m
Drainage: imperfectly
Perviousness: moderately
Effective rooting depth: 50 cm
Classification: Gleyed Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragments (%)
		moist	dry		grade	class	kind	moist	wet		
LF	5-0										
Ah	0-1	dark brown (7.5YR 3/2)	dark brown (10YR 4/3)	sandy loam	weak	fine	granular	very friable	nonsticky	none	15
Bm1	1-11	dark yellowish brown (10YR 4/4)	light yellowish brown(10YR 6/3.5)	sandy loam	weak	fine to medium	granular	very friable	nonsticky	none	15
Bm2	11-27	dark brown (7.5YR 4/4)	brown (7.5YR 5/4)	loamy sand	weak	medium	granular	very friable	nonsticky	none	15
Bm3	27-48	dark brown (7.5YR 3/4)	dark brown (7.5YR 4/4)	gravelly loamy sand	weak	medium	subangular blocky	very friable	nonsticky	none	30
Bgj	48-60	yellowish brown (10YR 5/4)	pale brown (10YR 6/3)	sandy loam	moderate	coarse	subangular blocky	friable	slightly sticky	few,fine,dist. dark brown (7.5YR 4/4)	15
IIBg	60-80	light olive brown (2.5Y 5/4)	pale yellow (2.5Y 7/4)	loam			massive	friable	slightly sticky	com.,medium,prom. dark brown (7.5YR 4/4)	10
IICg1	80-138	light olive brown	light gray	loam			massive	firm	nonsticky	com.,fine,prom. dark brown (7.5YR 4/4)	10
IICg2	138-150+	grayish brown (2.5Y 5/2)	light brownish gray (2.5Y 6/2)	silt loam			massive	firm	sticky	com.,fine,prom. dark brown (7.5YR 4/4)	10

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Cation exchange (meq/100 g soil)					Base sat. (%)	Particle size distribution				Soil erosion K-value
					Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
LF	5.5	19.6	0.6	34													
Bm1	4.2	1.5	0.1	13	0.2	0.2	11.8	1.6	0.6	0.5	0.1	21	64	6	29	7	0.20
Bm2	4.8	1.0	0.1	20	0.2	0.2	10.7	2.5	1.2	0.2	0.1	36	63	6	24	12	0.22
Bm3	5.0	0.6	0.0	14	0.2	0.2	6.0	1.0	0.7	0.1	0.1	31	83		12	5	0.14
Bgj	5.0	0.4	0.0	19	0.1	0.1	9.5	3.3	2.0	0.1	0.2	57	57		33	10	0.29
IIBg	5.0						18.0	6.7	4.7	0.1	0.2	66	38		45	17	0.39
IIcg	5.4						21.4	9.5	6.8	0.1	0.3	78	36		47	17	0.42
IICg2	5.4						22.7	11.1	8.6	0.1	0.4	89	30		52	18	0.45

MAPS
NOT
FILMED

CARTES
OMISES